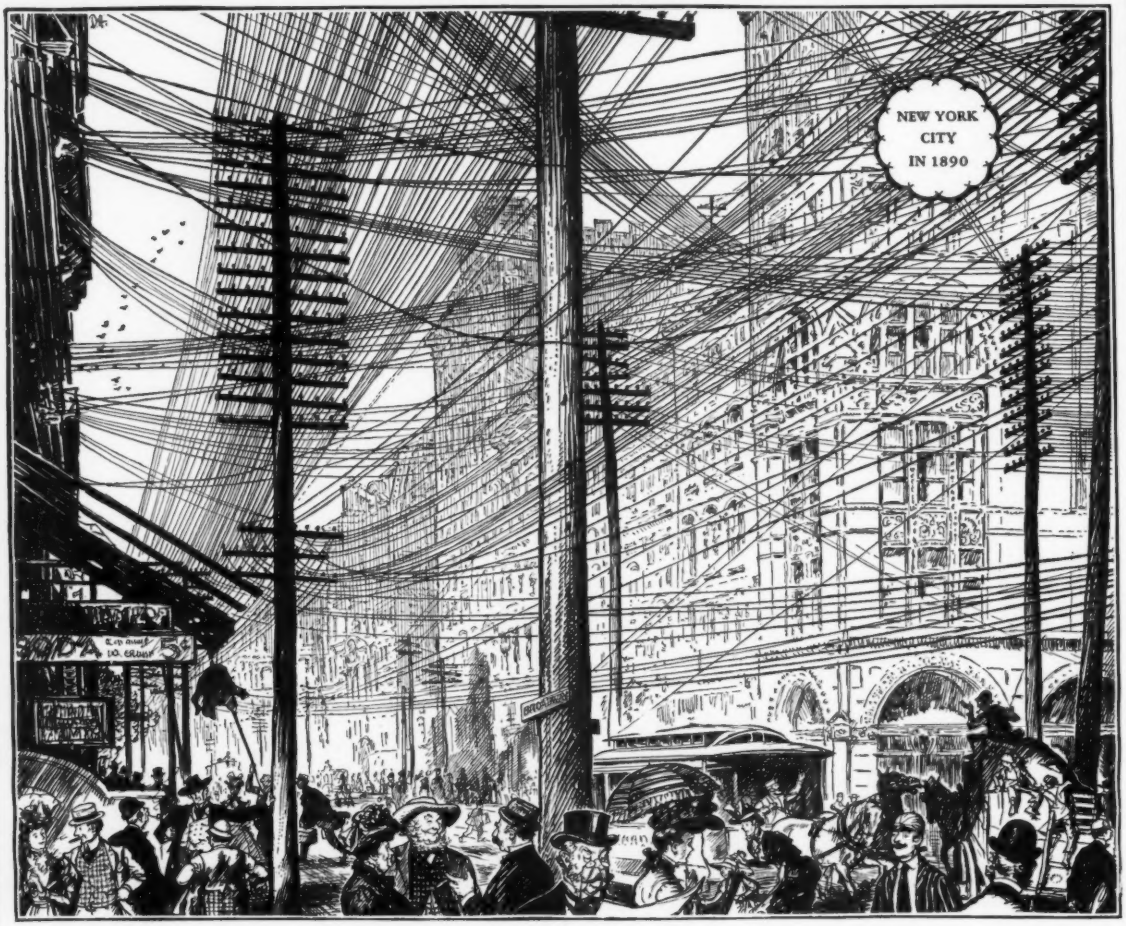
American
FORESTS
Anniversary Number
September 1935



Years of Progress

HAVE BROUGHT MANY IMPROVEMENTS IN TELEPHONE SERVICE

BACK in the early days of the telephone, practically all wires were carried overhead on poles or on house-tops. Some of the tallest poles carried as many as thirty cross-arms and three hundred wires.

If the old system were in use today the streets of our larger cities would scarcely have room enough for their canopy of wires. Traffic would be impeded, telephone service subject to the whims of nature.

Better ways had to be found and the Bell System found those ways. As many as 1800 pairs of wires are now carried in a cable no larger than a baseball bat. Ninety-four per cent of the Bell System's 80,000,000 miles of wire is in cable; sixty-five per cent of it is beneath the ground.

This has meant a series of conquests of space, and insured greater clarity and dependability for every telephone user. But it is only one of many kinds of improvements that have been made.

The present generation does not remember the old days of the telephone. Service is now so efficient that you accept it as a matter of course. It seems as if it must always have been so. Yet it would be far different today if it were not for the formation and development of the Bell System.

Its plan of centralized research, manufacture and administration — with localized operation — has given America the best telephone service in the world.

Americans talk over Bell System wires 59,000,000 *times a day. In relation to population there are six times as many telephones in this country as in Europe and the telephone is used nine times as much.*

BELL TELEPHONE SYSTEM

Entered as second-class matter at the Post-Office at Washington, D. C., under the Act of March 3, 1879. Acceptable for mailing at special rate of postage provided in Section 1103, Act of October 3, 1917, authorized July 10, 1918. Additional Entry at Baltimore, Md., December 29, 1931.

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OVID BUTLER, Editor

LILIAN CROMELIN and ERLE KAUFFMAN, Assistant Editors

Volume 41
No. 9

SEPTEMBER
1935

ANNIVERSARY NUMBER

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Photograph by GABRIEL MOULIN

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The American Forestry Association

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Binder for AMERICAN FORESTS Magazine. Made of dark brown fabrikoid with bronze colored decoration. Holds 12 issues. **Price, $2.50.**

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Discount of 10% or more on books of nearly all publishers when purchased through the Association.

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Travel and Recreation Information to save time and money.

Trips into the forest wilderness of America with the Association's Trail Riders every summer.

Photographic Service and Prizes.

Helpful Information on forestry from the Forester's Office.

Members are invited to make full use of these services. Others are invited to send their applications for membership to the Executive Secretary.

Just Published*—CONSERVATION—*A Digest for the Conservationist

RECOGNIZING that a great many people are interested in the conservation of natural resources, but have not time to keep abreast of the numerous important articles in current periodicals, The American Forestry Association now publishes CONSERVATION, a readers' digest of current articles reporting on the entire field of conservation. Important articles are selected from current magazines, books and newspapers and reprinted in CONSERVATION in condensed form. They are brief, timely and authoritative.

A subscription to CONSERVATION costs 50c a year. This small expenditure saves the time required to read many periodicals, and saves the cost of buying them. CONSERVATION is published every other month. Subscribe today.

Please Send Orders to the Association's Office in Washington

Greetings to a 60 Year-Old

The National Lumber Manufacturers Association (organized in 1902) congratulates the American Forestry Association upon its long career of high usefulness since 1875.

For a quarter century American forest industry has been in gradual transition from a transitory to a permanent basis. That transition will probably continue for another quarter century. It will be helped by wise, and will be retarded by unwise, public and industry actions.

On behalf of the federated regional Associations comprising the "National" we pledge the continued earnest effort of our forest industries to determine and to aid the establishment of practical measures for sustained production and wise use of our forest resources.

We bespeak an equal measure of interest and cooperation to the same end by public agencies, State and Federal.

THE NATIONAL LUMBER MANUFACTURERS ASSOCIATION

A Federation of Associations of Lumber Manufacturers including:

American Walnut Manufacturers Association
Appalachian Hardwood Manufacturers, Inc.
California Redwood Association
Maple Flooring Manufacturers Association
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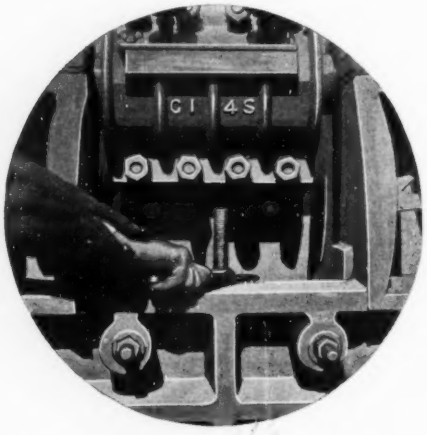
Northern Pine Manufacturers Association
Southern Cypress Manufacturers Association
Southern Pine Association
West Coast Lumbermen's Association
Western Pine Association

What America Needs Most-

. . . IS MORE MACHINES THAT EMPLOY MORE MEN, YET SAVE MORE MONEY* . . .



* The DAY "Original" Traveling Crusher is one of the few machines manufactured today which employs more men than former methods. Yet, in building secondary roads, trails, parks, etc., the DAY does a better job at much less cost. This is the reason the Day Traveling Crusher will render vital service to W. P. A. Although the Day is in fact a portable crusher, it is a brute for service because it's built that way. In mud or sunshine, wherever the tractor goes the Day crushes rock. Old worn out track-type tractors, practically useless for draw-bar work because of expensive repairs necessary for idlers, sprockets, tracks, etc., but with good engines, are ready for service just as they are for crushing rock with the Day.

INSTANT ADJUSTMENTS . . .

Operation need never stop . . . a few simple turns of an adjustment nut and the size of the crushed material is changed. This is just one of several worth while features of the Day.

DAY PERFORMANCE . . . .

FORTY CENTS per TON, on the road . . . that is all it costs to maintain this heavy traveled Colorado road—shown at the right—with the DAY. Formerly, the rock which fell from the hillsides of this road was thrown over the opposite bank . . . a total loss and wasted labor expense.

Write or wire for complete details . . . "YOU CAN'T GO WRONG IN A DAY."

DAY PULVERIZER CO. Inc. Knoxville, Tenn.

ROUGHING-OUT WITH THE TRAIL-BUILDER
FINISHING-OFF WITH THE GRADER—
THE SAME "CATERPILLAR" DIESEL POWERS BOTH JOBS

At a fuel cost that would barely buy its driver's grub, this "Caterpillar" Diesel Tractor matches its surplus stamina and balanced weight against stubborn rocks and tough roots—battles through with the trail builder. Then it marches the "Caterpillar" Grader back and forth—the grader with the blade action and strength to slope a bank, carve a ditch, plane down the bumps and turn a rough trail into a smooth road. . . . Hours add up, daily Diesel savings multiply—for the "Caterpillar" Diesel is built to meet the show-down of double-duty service! Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL

EXPLOSIVES *and* —a du Pont doctrine

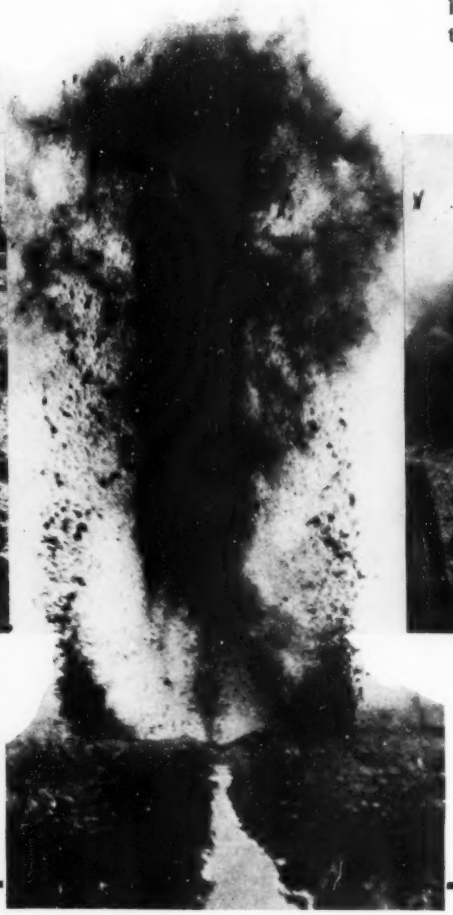
THE right way to do any kind of work is to do the greatest possible amount with the least possible effort and cost. Explosives, properly used by themselves, or in combination with other engineering agents, have been one of the greatest of all factors in speeding up the world's work and in relieving mankind of heartbreaking toil.

For more than a hundred years du Pont has made commercial explosives. In all that time du Pont has never advised the use of explosives when some other engineering agent would do a job better. Du Pont engineers are constantly working out ways where a minimum amount of explosives will do the maximum amount of work.

Du Pont engineers have cooperated with government officials in charge of the reclamation and construction work done by the CCC camps, to work out methods of using explosives in the most efficient and economical manner.

Since the CCC camps have been in operation, 50 million pounds of dynamite have been used by CCC engineers. It has demonstrated its great value in speeding up the building of highways and dams, the quarrying of rock, the straight-

STREAMS—Dynamite is used to "streamline" the channels of crooked streams, providing quicker drainage, reducing the danger of floods and erosion.



STUMPS—Dynamite splits up stumps so that they may be removed with the minimum of effort.

DITCHES—Ditching with dynamite is frequently successful where conditions make other methods impractical.

DU PONT
REG. U. S. PAT. OFF.

E. I. DU PONT DE NEMOURS & CO., INC.

ECONOMICS

ening of streams, the clearing of fire lanes through forests, the checking of soil erosion, the construction of new ditches and the cleaning out of old ones. Work that is of incalculable value, not only to those who are living but to future generations.

More than a million CCC men between the ages of 18 and 25 have gained first-hand knowledge of how to use dynamite and how its power can help do more and better work.

This teaching of how and where to use dynamite to so large a number of young citizens is one of the advantages of the CCC camps that is not often thought of. It is really one of major importance.

If you have some work in hand in which you are going to use explosives, we shall be glad to cooperate with you in working out the best methods for its accomplishment.

We have explosives for every purpose and booklets describing them. Write for whatever information you would like to have.

GULLIES—Gully erosion is stopped by building temporary dams . . . Blasting soil into gully bottoms . . . and planting trees in blasted soil.

DAMS—Dynamite is used to blast channels in bed rock to anchor flood control dams.

FIRE LANES—Explosives are used in clearing, building and maintaining fire lanes so essential to the prevention of forest fires.

QUARRIES—Blasted rock from quarries is used for dam and highway construction.

CUTS—Rock cuts are blasted along scenic highways to ensure easy grades and safer alignment.

EXPLOSIVES DEPT., 6107 DU PONT BLDG. WILMINGTON, DEL.

ANNIVERSARY NUMBER

1875 ❖ 1935

ON September 10, 1935, The American Forestry Association will have completed sixty years of continuous public service in behalf of the country's forest resources. First organized September 10, 1875, in Chicago, the Association seven years later merged with The American Forestry Congress, formed in 1882 in Cincinnati. At that time there was no conservation in America and little sentiment for it, because people generally were not awake to the inevitable effects of the destructive exploitation of natural wealth which everywhere marked America's development.

The Association was the first national organization to essay the task of creating and organizing public sentiment in support of State and National policies that would perpetuate through wise use the forests and other renewable resources essential to the maintenance of American life. From its beginning, the Association without lapse of effort has held to its course of educational leadership, seeking always to promulgate those measures that promise the greatest human benefits.

This number of *AMERICAN FORESTS* is issued to commemorate the Association's sixtieth anniversary by giving a graphic picture of the growth and development of conservation since the Association first pioneered the field. The editors desire to acknowledge with grateful appreciation the cooperation rendered by the Federal bureaus concerned, and the helpful services voluntarily given by the following individuals in the preparation of the sections quoted:

R. V. Reynolds, "The Story of Lumbering"; R. K. Helphenstine, Jr., "The Age of Wood"; Arthur C. Ringland, "The Public Domain"; John D. Guthrie, "The National Forests"; Herbert A. Smith, "The Growth of State Forestry"; Samuel T. Dana, "The Spread of Forest Education"; Robert Sterling Yard, "The National Parks"; Herbert Evison, "The Story of State Parks"; Ward Shepard, "The Indian Forests"; Isabelle Story, "The National Monuments"; Seth Gordon, "The Conservation of Wildlife"; Henry S. Graves, "The Problem of Water"; and John B. Woods, "Conservation and the Lumber Code".

Grateful acknowledgment is also made to those members of the Association who by financial contributions have helped to underwrite the extra publishing costs and have thereby made possible this *ANNIVERSARY NUMBER.*

THE EDITORS.

Engraved by J. Sartain

The First Ship

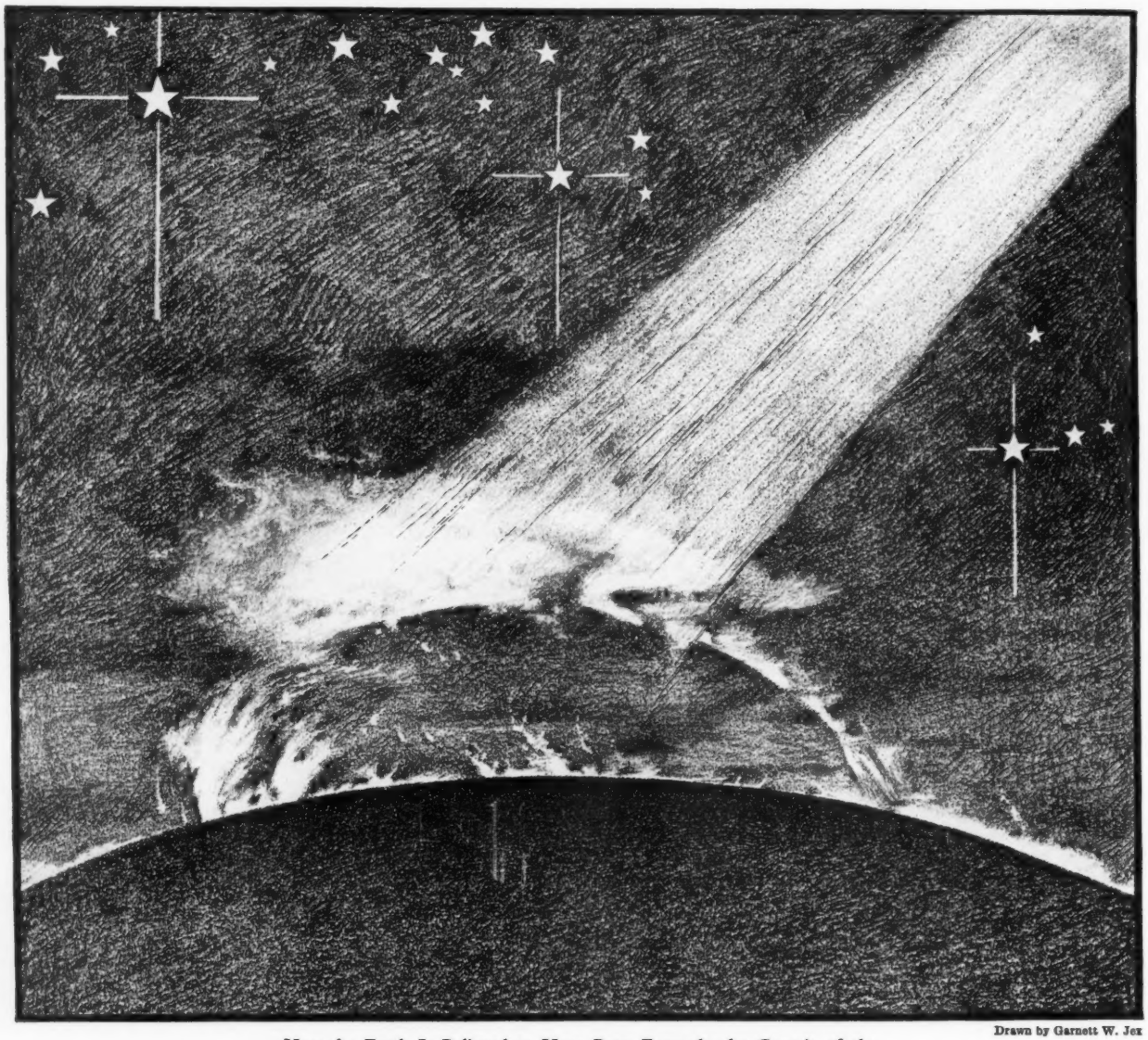
FOREWORD

THE story of American conservation is the story of America—its land, its resources and its people. It is the purpose of this volume to give the reader a graphic picture of our organic natural resources, the part they have played in the development of the country, the manner and consequences of their use, and the spread of the conservation movement from its beginning in the United States down to the present time. Detail has been omitted to bring into bolder relief the more important outlines of the picture.

A few centuries ago, Old World navigators pushing the frontiers of the sea westward came eventually to the shores of a New World. It was a virgin land where nature through millions of years had performed its miracles of creation undisturbed and undiscovered by white men. Little indeed did the hardy explorers know of the character of land that lay beyond the shore lines. It remained for those who came after them to lift the frontier from the sea onto the land and pushing ever westward to marvel at an unfolding panorama of fertile soils, vast forests, well watered valleys, majestic mountain ranges, rolling prairies, abundant wildlife, streams and lakes teeming with fish life.

Never before in man's conquest of the earth had he come upon such a storehouse of diversified natural wealth. It fired his imagination with dreams of a new empire blessed with social freedom and inexhaustible plenty. Forthwith he set about the building of the nation we know today as the United States of America. Because of the extent and diversity of resources, the task went forward with a speed and grandeur that was to astound the Old World.

Whence came these natural resources that our forebears found awaiting them and that enabled our young country so quickly to take its place among the nations of the world? To appreciate the earth changes and the countless years that have gone into the making of our land sculpture and the formation of its natural resources to which we fortuitously fell heir, one need only let his mind's eye sweep across the ages from the time the earth was a new-born thing to the outline of America as found by men who sailed their ships into unknown seas.



Drawn by Garnett W. Jex

How the Earth Is Believed to Have Been Formed—the Genesis of the Long, Long Story of the Formation of Our Land and Its Resources.

THE STORY OF THE AGES

THE FIRST SOIL

THE earth was born after the manner of Eve. It is, according to the most accepted theory, part of a planetary "Adam's rib" that was drawn from the sun's side by the attractive force of a large swiftly moving star passing near the sun something more than two billions of years ago. From this bundle of sun-stuff, which, curiously enough, was shaped something like a corpulent rib, all of the planets are thought in the course of time to have been formed by condensation into larger and smaller globes. Small bodies cool faster than large ones so the smaller whirling earth in time lost a portion of its heat. From an almost mist of much larger dimensions than now, it contracted and solidified. Within the welter of its heated interior there came together elements, curiously joined and combined, to form the beginnings of that vast mineral and metal wealth which underlies the earth's surface. The inner molten magma contained hydrogen and oxygen, which, squeezed out on the earth's rind, combined to form water. The excess of oxygen with inert nitrogen joined to create that lighter envelope, the atmosphere. Clouds of water vapor cooled, condensed, and fell as torrential rains on the earth. Thus began the long story of erosion, the wearing away of the hard rocks, of the first soil, and of the first sea.

Volcanic ash may have formed the first soil. But running water entered early into the picture, and the earth-old process of sedimentation was begun, to be accelerated by the volcano, the wind, flowing water, the slower flow of grinding ice, the friction of rock on rock in landslide or torrent, the slow but certain action of heat and cold to crack and crumble stone. But through those far gone Archeozoic and Proterozoic Eras, which lasted about one and one-half billion years, one soil-making element was lacking—the slow erosion caused by life: the pressure of roots that probe and pry; the patient burrowing of earthworms, the animals that dig.

Life Began in the Sea. A Restoration of Plant and Animal Life in a Middle Cambrian Sea (early Paleozoic), Some 450 Million Years Ago. Courtesy of Smithsonian Scientific Series, Inc.

THE FIRST FORESTS

THROUGH the millions of years, water seeped and trickled and thundered across and adown the face of the earth, seeking out its minutest crevices, gathering what it might find and carrying it to that great restless reservoir, the sea. What there was of soluble matter in the rocks, the water took. So there came to be the salt sea. Then, as the long desert Proterozoic Era drew to its close with the seas well salted and soil formed upon the rocks, the proper physical and chemical conditions happened to occur in the constant-tempered ocean—and life was born. As though by foreordainment, this primal life was plant-like, setting about to populate the pastures of the sea and to pave the way for animal creatures to feed upon their cousins, the plants, even as they do today. By mid-Cambrian time, five hundred fifty million years ago, the plants had moved upward in the scale to form algae, of the same clan as the seaweeds and pond-scums of today, and animals had gathered calcium from the water to build shell-houses on their backs. Slowly, cautiously at first, the plants tested the inter-tidal area, found it good, and moved boldly out upon the land. In the Devonian period—the Age of Fishes—in the middle of the Paleozoic Era, there grew upon the flat featureless land the first forest of which any record has been found. On the swampy shore fern-like trees stood forty feet high with fronds six to nine feet long, some of them bearing primitive seeds.

The Oldest Known Fossil Forest. In This Depiction of the Gilboa Devonian Forest of New York, Behind a Setting of Modern Rocks, Stands the Restored Primitive Tree-growth. Courtesy of the New York State Museum.

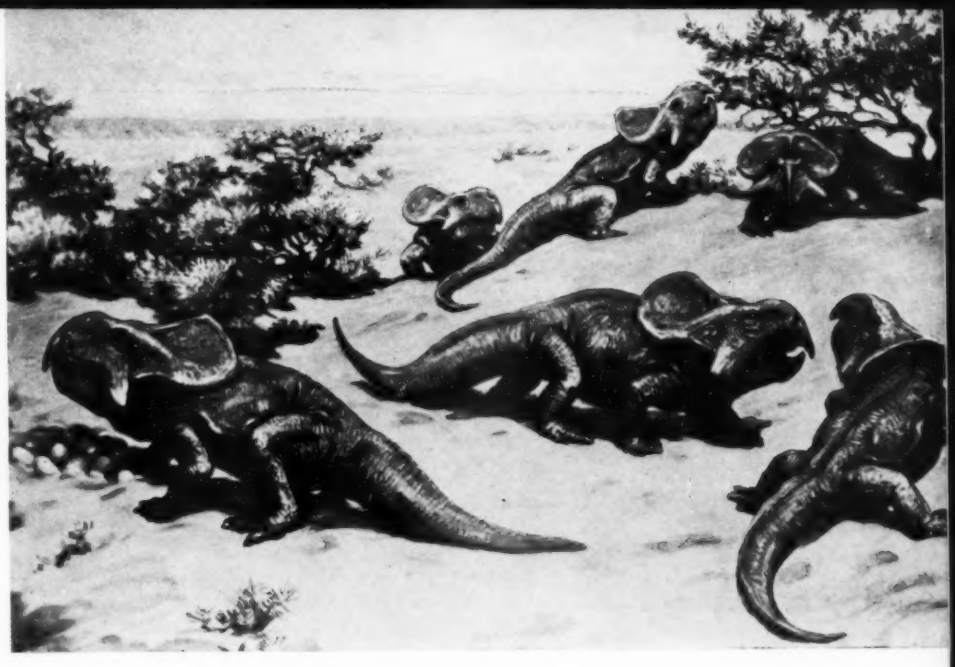
Restoration of a Swamp Forest of the Pennsylvanian Coal Period. Courtesy of the Field Museum, at Chicago.

THE COAL FORESTS

ONCE the trees had conquered the land, they waxed and diversified in the humid tropical Paleozoic Era until they covered the earth with lush greenery. Then came that curious Carboniferous chapter in earth history when trees grew and perished and fell and were buried by sediments to form the black inflammable rock which we call coal. A typical Carboniferous landscape was much like a Dismal Swamp, thick-grown with prototypes of contemporary conifers. The first insects, giant cockroaches, had appeared; dragon-flies with a thirty inch wing-spread flitted about; and fat clumsy salamanders sprawled in the slime.

Following the coal-bearing period there came a change upon the face of the earth. There were earthquakes, the building of mountains, the submergence and emergence of land-masses. The Triassic period ushered in the Mesozoic Era and reptiles were distinctly on the upgrade. The vegetation suffered, and the beasts turned carnivorous. Plant life survived mainly in the form of early conifers, forebears of present evergreens, among them the trees which exist today in the petrified forests of Arizona.

Restoration of Mesozoic (Triassic) Forest. Plants of this Nature Contributed to the Coal Beds, Particularly Brown Coal, Formed During this Period in Earth History. (After Unger "Die Urwelt.")

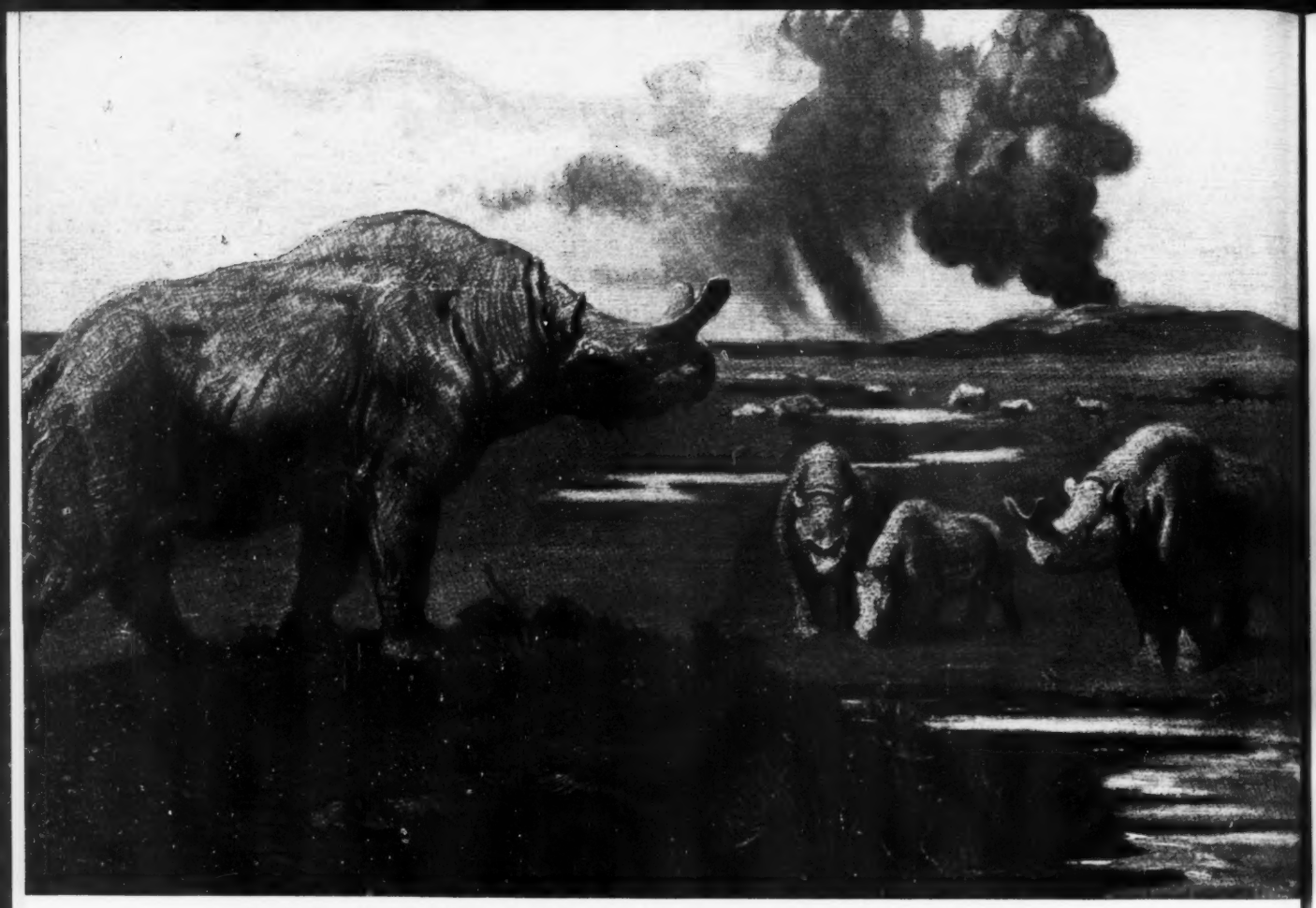


Dinosaurs Walked the Land When the Trees of the Arizona Petrified Forest were Growing. Painting of Protoceratops, or Egg-Laying Dinosaurs of the Gobi Desert, by Charles R. Knight. Gift of Everett R. Graham, Courtesy of Field Museum at Chicago.

THE AGE OF REPTILES

THE patient mill of time ground on into the Jurassic period. Dinosaurs were on the increase and existed in every size and shape, from the stature of a chicken up to the great lumbering twenty-ton Brontosaurus. As an offshoot from the lizards, the first bird, Archaeopteryx, came on the scene. And the reptiles thronged the seas and the lands, lords of the Jurassic, moving on through the millions of years, to leave us eventually the alligator and the snakes as their diverse progeny on earth. Botanically, the Jurassic was the "Age of Cycads." Plants of a family with the comfort-root or coontie of Florida and the sago palm of Mexico and the West Indies were more widespread than any other form. The gingko, which had its beginnings in Triassic time, was by now spread over the earth, which had its mountains and valleys and diverse land forms much as it has today, but in different locations. For what was then land is in many cases water today, and what are now the Jura Alps had then no more prominence than an ordinary country landscape. Conifers and ferns were in great abundance.

Restoration of the Land Plant Life of Mesozoic (Jurassic) Times—Tall, Feathery-leaved Cycads and Ferns. (After Unger "Die Urwelt.")



On the Bounty of the Plains Lived Many Grazing Creatures of Early Tertiary Time, Such as this Herd of Flat-horned Brontotheres. Restoration by Erwin Christman and Charles R. Knight.

THE WORLD BEGINS TO FLOWER

THE long thread of time wended on into the Cretaceous period, bringing with it many changes. The reptiles, which had reached their height in the Jurassic, were on the downgrade as a race, though they existed in profusion. Our Great Plains were saurian gathering places, for dinosaur remains have been found there in plenty. There were big dinosaurs and little dinosaurs, vegetarians and flesh-eaters, harmless shore and swamp feeders like the stupendous Brontosaurus or "thunder lizard." In America's mid-continent Mediterranean there swam the fierce Mosasaurus, thirty feet long, who with one snap of his jaws might decapitate the giant Archelon turtle, twelve feet from flipper to flipper.

Flourishing yet, but on the wane, the reptiles watched the ferns, cycads, and conifers gradually lose their footing as leaders in world flora; saw them displaced by the flowering plants; saw the hardwoods enter the world picture; saw growing the earliest tulip-trees, magnolias, bayberries, maples, persimmons, walnuts, sumacs, dogwoods, and spice bushes. And upon this fearsome scene the first grasses grew, gleaning sunlight through the forest cover where and when they might.

Then, sixty million years ago, as the final Cenozoic Era dawned, its first sub-chapter, the Eocene epoch, brought another picture on the earth. The reptiles were for the most part gone. The grasses, until now unable to lift their heads high enough to the sun to compete with the all-encompassing trees, began to marshal their forces for the conquest of the plains as the Rockies builded taller and taller and cut off the life-bearing moisture from the Pacific. Nature, aweary of creating titanic reptiles, now put her hand to the making of tiny mammals. There was little Eohippus, the dawn horse, no larger than a fox, who browsed in the forest, and only gradually moved out on the plains to take advantage of this new succulence—grass. There was Protomeryx, the father of camels and llamas, scarcely as large as a tabby cat. There was Diacoclexis, the size of a cottontail rabbit, destined to beget the cud-chewing animals of the plains. And there were others, the Brontotheres, an almost rhinoceros-like animal; the root-eating giant hogs; the small rhinoceroses. These unprotected herds in the open plains called forth their antitypes, the carnivores. There were sabre-tooth tigers, jaguars and later wild dogs. The herding instinct evolved as a protection against these prowlers of the plains. And the psychology of the pack came into being to meet force with force. Out of that long ago beginning there came about the balance of power between the grass-eating herds and the dog and cat tribes. Came, too, the essentials which shaped the nomadic, herd-following Indians to the life geography had made for them.

THE PAST SCULPTURES THE PRESENT

THE Miocene epoch is the climax of the geologic story as we who know flowering plants and mammal forms are accustomed to think of it, for it was in that comparatively recent time that each reached the height of its development. The Rocky Mountains had risen almost to their present height and the Great Plains had been formed. The mountain chains of Europe—the Alps, the Himalayas, and others—were builded during the Miocene, and it was a time of widespread growth of all kinds of trees. Most of our common trees were already in existence, and usually they were represented by more species than we find growing today. Peach trees grew native in America in that time, though they became extinct later, and are here today only by virtue of having been introduced, and we had an ailanthus closely related to the present introduced form, the Chinese "Tree of Heaven." The Pliocene epoch, in terms of our story, was a time of transition. There was a gradual lowering of temperatures, and the arboreal inhabitants of earth, making use of convenient land bridges, began to select the provinces most suited to their growth. It served as an introduction to that spectacular epoch which came next, the Pleistocene,—the Ice Age. Down out of the north in icy phalanxes crept succeeding attacks of the Glacial King. Before them plants and animals retreated. There was time enough, in most cases, for the trees to cast their seeds before them and insure the continuance of their tribe before the Long Winter ground them to extinction. The mobile animals had a more easy time of it, for they were not rooted to earth. But the mammoths and the rhinoceroses and many other animals found it convenient to put on a hairy coat to protect them from the cold. In earth's history this was but yesterday, for man was already in existence, and it may have been the succeeding waves of cold that jogged his primitive sluggish being into that action and initiative on which we so much pride ourselves today. A dweller in the forests, this early man looked out on trees that differ little from those we are accustomed to see today. Though it is true that the men who lived in Europe in the time of the Ice Age became accustomed to trees fewer in variety than those men, if any, who inhabited the North American continent. This was due entirely to the direction the mountains ran. Europe was so unfortunate as to have its Alps, its Pyrenees, and its Carpathians extending directly across the path of the ice sheet. The trees could not retreat before them. They grew as far up the mountains as they could, and there died from cold. Europe lost hundreds of tree species in this way during the Pleistocene. So it is not too much to be wondered that when historic times were ushered in and men crossed the sea in ships to a new found world they were profoundly impressed by the wealth of forest with which the virgin soils were laden.

A Restoration of Land Plant Life of Middle Tertiary (Miocene) Times. Fig Trees Are Shown at the Left, with Birthworts, Sedges, Palms and Tree Ferns. (After Unger, "Die Urwelt.")

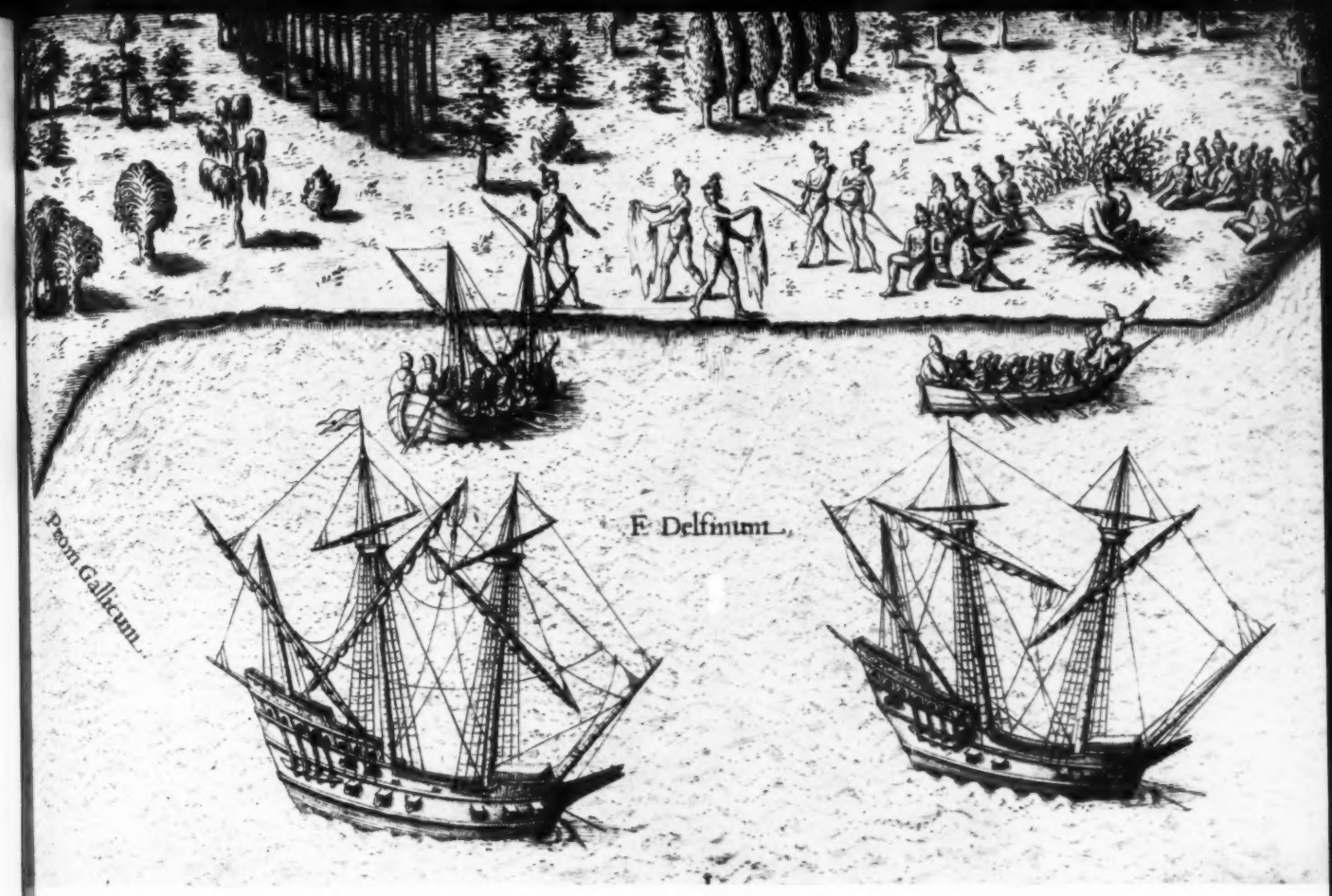
FINDING THE FORESTS

THE VOYAGE OF THE VIKINGS

ABOUT the year 986 A.D., when Bjarni Heriulfsson sailed out from Iceland to go to the new Norse colony of Greenland, winds raged upon the sea and the sun and stars were blotted out. Bjarni trimmed the sail of his long-boat and scudded on before the storm. So it was that he came to a new land, that was "level, and covered with woods." Bjarni did not come to land, but went on until he saw the ice of Greenland and came to his own people. At just what point Bjarni and the later Vikings came upon the continent of America, those wise in the study of old books are not in full accord, but it seems to be true that this was the first sight white men had of the mainland of America and its forests. It was in the year 1003 that Leif Eriksson came upon this same land and made use of the forests. Says the Icelandic Saga, "There were also those trees there which are called 'Mausur', and of all these they took specimens. Some of the timbers were so large that they were used in building,"—timbers for shipbuilding, and vines to withe them together. And Thorvald went to this Vineland the Good, in the year 1005, and when his ships went back to Greenland, they were freighted with grapes and wood. "Now it is to be told, that when Thorfinn Karlsefni went there in 1012 A.D., he caused a strong wooded palisade to be constructed and set up around the house." And he "caused the trees to be felled, and to be hewed into timbers, wherewith to load his ship, and the wood was placed upon a cliff to dry. . . ."

E. L. Gould

"The Land Was Covered With Woods," Bjarni Heriulfsson, the Viking, Wrote When He Skirted the Shores of America in 986 A. D.



Trees on the Southeast Coast of North America, Discovered on Easter, Inspired Ponce de Leon to Name It Florida. This Map, Drawn in 1564 by Jacques Le Moynes de Morgues, Is Probably the First Graphic Representation of America's Trees.

"PASCUA FLORIDA"

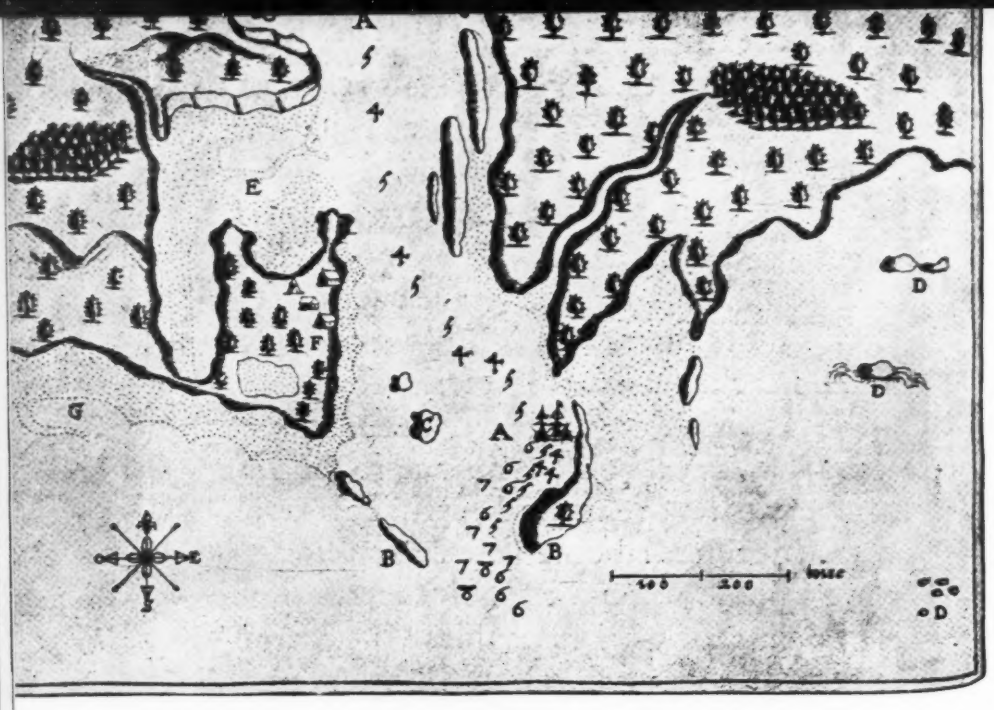
COLUMBUS' discovery of Hispaniola and the West Indies in 1492 was yet news in Europe when Giovanni Cabotto, a Genoese, called Cabot, went out from England, before the turn of the sixteenth century, and sailed along the coast of what is today known as New England. But the story of Cabot's voyage exists only in a few letters, so of what he saw and what he thought there is very little record. After him, the first person to see the American mainland was Juan Ponce de Leon, a Spaniard, in the year 1513. "They steered then along ye coaste for the purpose of seekying a haven and this same nyghte they saw lande nearebye at eighte fathom water; which they supposed to be an ilande and straitwaye named it Florida, on account of the marvelous viewe which met their eyes of beautiful Orchardes, Plantes, level gardens and animal kynde; and then as Jean Ponce nowe allsoe discovered the daye to bee ('Pascua Florida,' Easter) Sunday, he determined for those twoo reasons to give this name to ye lande."

And great was the fortitude of Don Ferdinando De Soto, when, in 1539, he entered the Florida country with armored men and horse and started inland. Indians to guide him he could not get "because the countrie is cumbersome with woods and bogs . . . . And hee came to a river with a great current, and upon a tree, which was in the midst of it, was made a bridge," probably the first used by white men in America. But there was forest beauty too: "And the trees grow in the fields without planting or dressing them, and are as big and as rancke, as though they grew in gardens digged and watered."

But the French came also to Florida in those days and strove against the Spaniards for possession of it. Jean Ribault, landing in 1562, wrote that "we found the place as pleasaunt as was possible, for it was all covered over with mightie high Oakes and infinite store of Cedars, and with Lentiskes growing underneath them, smelling so sweetly, that the very fragrant odor only made the place to seeme exceedingly pleasant."

Ribault's countryman, Rene Laudonniere, shared with him the duty of freeing Florida from the Spanish yoke. He carried with him to Florida in 1564 an artist named Jacques Le Moyne de Morgues, who made the first pictures ever taken at first hand in Florida. One of forty he made is here reproduced. Laudonniere was also impressed with Florida's forest beauty: "There groweth in those partes great quantitie of Pinetrees . . . . Their woods are full of Oakes, Walnuttrees, blacke Cherrietrees, Mulberry trees, Lentiskes, and Chestnut trees . . . . There is great store of Cedars, Cypresses, Bayes, Palme trees, Hollies, and wilde Vines."

It remained for later explorers and settlers inward from the coast to plumb the extent and possibilities of the four southern pines, the cypresses, the gums, and oaks, of the southern Coastal Plain.



A "Land High Full of Thicke Woods" was Found by Verrazzano in New England in 1524. Champlain First Pictured the Trees of Maine, on the Accompanying Map, in the Year 1604.

"THICKE WOODS"

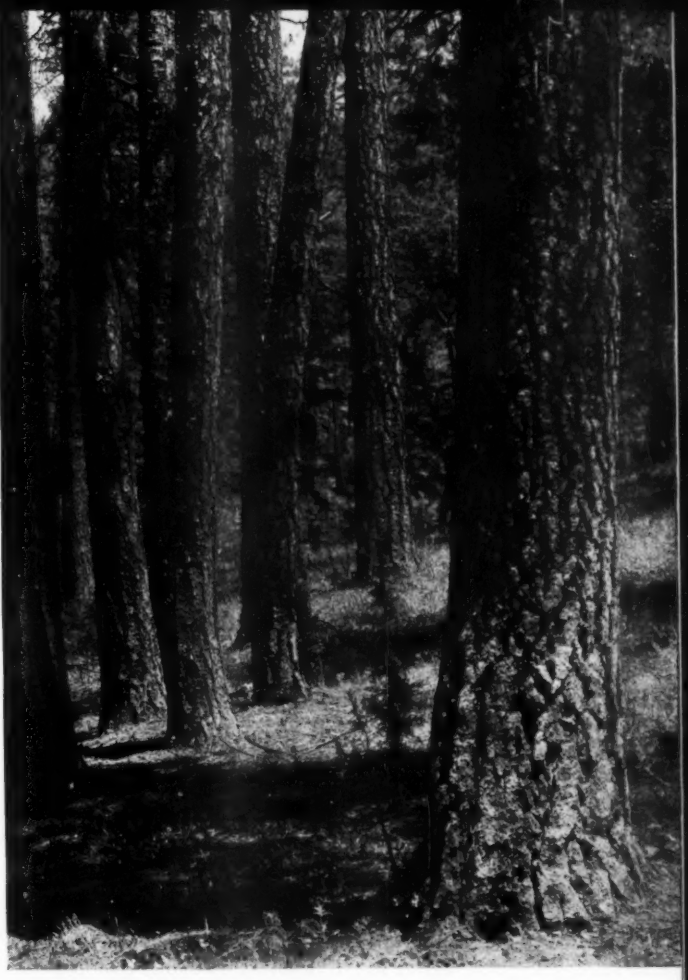
THE first description of the New England coast that has come down to us is that of Verrazzano from the year 1524. "We found another land high full of thicke woods," he wrote, "the trees whereof were firres, cipresses and such like as are wont to grow in cold Countreys." Samuel Champlain, the French explorer, who touched on the Maine coast in 1605, drew a map, here reproduced, of the coast at the mouth of the Kennebec River upon which is recorded the first representation of New England's trees. And though Captain John Smith, in 1614, was highly impressed with the potentialities of a country whose "treasures having yet never beene opened, nor her originalls wasted, consumed nor abused," was "overgrowen with all sorts of excellent good woodes for building houses, boats, barks or shippes," he could have little guessed the treasury of white pine, spruce, maple, ash, elm, and other "excellent good woodes" that awaited further explorers and settlers.

In 1535, Jacques Cartier, the Frenchman, penetrated inland up the St. Lawrence Valley as far as the present Montreal. Sailing up the river, he "saw as goodly and pleasant a countrey as possible can be wished for, full of all sorts of goodly trees, Cedars, Firres, Ashes, Boxe, Willowes." Later travelers and fur traders came to regard the forests as a commonplace and little was said of them until that great era of inland exploration which brought the Mississippi River to light. Yet even when Father Louis Hennepin, who started with LaSalle to the Mississippi, in 1678, said of the Lakes region that "The Forests afford all manner of Timber fit for Building," he could have had only a general idea of the storehouse of white pine and Norway pine, spruce, hemlock, maple, ash, and many other tree kinds that had waited through prehistory for the use of mankind. Even then, the period of the fur traders passed and the era of emigration and settlement in the Lakes region ensued before any considerable use was made of its forest resources.

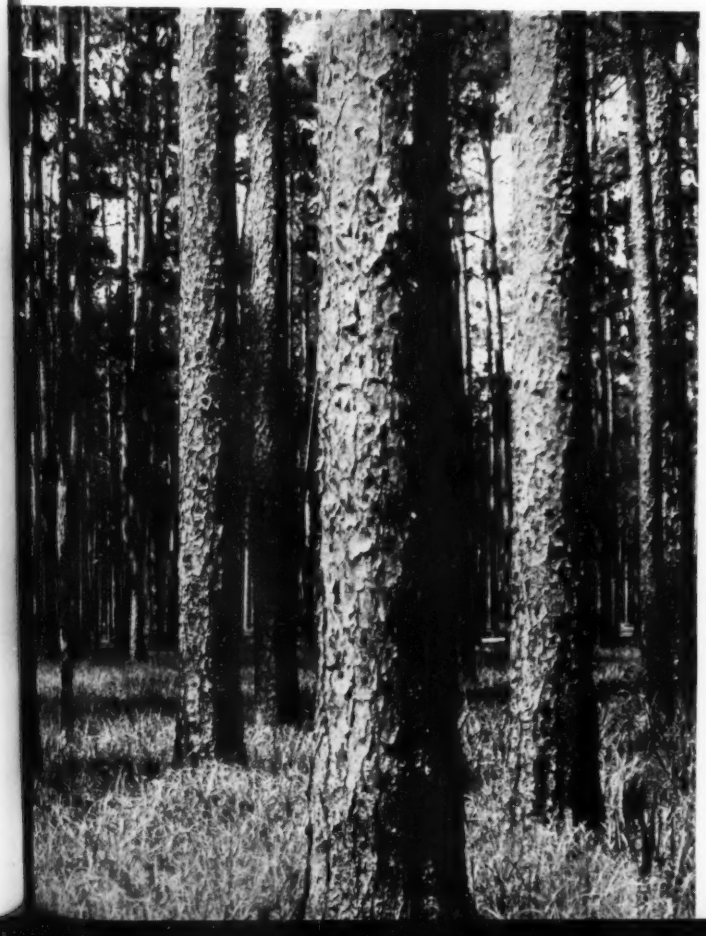
"As to the Trees, They are Nothing But Forests of High Trees," Wrote Henri Tonti, LaSalle's Lieutenant, When He Passed Through the Great Lakes Country, in 1683.

THE SEVEN CITIES OF CIBOLA

WHEN the Spanish friar, Marcos de Niza, journeyed into our Southwest in 1539 to hunt the fabulous riches of the seven cities of Cibola, he found it "a most plaine soyle, without trees and stones . . . . where there is no foode." Yet the Indians gave him "nuttes of Pine trees" to eat—the pinon nut—still a staple food of the Southwest Indian. Coronado, who went there in 1540, saw "mighty plaines, and sandie heathes, so smooth, and wearisome, and bare of wood . . . ." Still, he found "Nutte trees and Mulberie trees," and "a wood of small Cedars." It was not until the year 1583 that Antonio de Espejo uncovered some of the tremendous timber resources which so surprisingly lie hidden in the mountains. Espejo recorded that he passed through a country "full of mountaines and forrests of Pine trees." It is yet a matter of surprise to travelers in the Southwest that those far, blue mountains hide thousands and thousands of acres of Ponderosa pine, Douglas fir, Engelmann spruce, and blue spruce, parts of which are still virgin stands.



Antonio de Espejo Discovered the Timber Resources of the Southwest in 1583. He Passed "thorow Great Woods and Groves of Pine Trees Bearing Such Fruit as Those of Castile."



THE GREAT RIVER

FERDINANDO de SOTO, penetrating westward from Florida in 1543, was first to see the Mississippi River. Inland from the east coast of Florida, he found "thicke Woods, and in some places they are of wilde Pine-trees; and is a weake soyle." Further west were "many Groves of 'wilde Pine-trees'," and along the Mississippi "the Countrie is plaine, and the woods thinne." Here on this Great River were made the first boats, probably, ever manufactured in America. A "Portugall . . . . had learned to saw timber with a long Saw . . . . did teach others, which helped them to saw timber. And a Genowis . . . . with foure or five other Biscaine Carpenters, which hewed his plankes and other timbers, made the Brigandines." The French La Salle was the next white man to see the country of the Lower Mississippi Valley, in 1682. Henri Tonti, who was with him, said that "The woods are all those of a boggy district, the country one of canes and briars and of trees torn up by the roots; but a league or two from the river . . . . There is a second belt of true forest, where there are many fruits unknown to us, and an abundance of mulberry, laurel, and palm trees." It remained for the later French, Spanish, and American settlers to find and use the extensive stands of yellow pine, cypress, oak, red gum and cottonwood that waited there.

Ferdinando de Soto Was First to See and Use the Forest Wealth of the Lower Mississippi Valley in 1543. He found the "Countrie Plaine, and the Woods Thinne," but Sufficient to "cut Downe Timber" for Boats.

Henry Hudson, First to View the Interior Riches of the Hudson River Valley in 1609, Found "Greate Store of Goodly Okes, and Walnut Trees, Chestnut Trees, Ewe Trees and Trees of Sweet Wood in Abundance."

APPALACHIA

IN 1609, Henry Hudson advanced up the Hudson River. He "went on Land . . . . and found . . . . great store of goodly Oakes, and Walnut trees, and Chestnut trees, Ewe trees, and trees of sweet wood in great abundance." Samuel Champlain, who the same year discovered Lake Champlain, merely remarked that it was "surrounded by a number of fine trees similar to those we have in France." Hudson, the seaman, and Champlain, the explorer via the waterways, could not have known that they stood on the threshold of the great white pine, hemlock, maple, beech and birch forests that have so richly endowed the people of New York and Pennsylvania.

Alvaro Nunez Cabeza de Vaca was first to reach the southern Appalachians in 1528. He found "huge mountains and very high Trees." Yet his journey can scarce be given first importance, for it is recorded that up to 1669 when John Lederer first mounted the Blue Ridge, "the *Apalataean* (Blue Ridge) Mountains" stood "like the prodigious wall that divides China and Tartary, they deny *Virginia* passage into the West Continent." When Robert Fallam and Thomas Batts crossed the Alleghenies in 1671, the only mention they made of trees is that they burned initials on them. "It was a pleasing tho' dreadful sight," Fallam wrote, "to see the mountains and Hills as if piled one upon another." And again, as with other explorers, the Appalachian forests of white pine, spruce, hemlock, oak, chestnut, and tulip poplar must needs wait for the progress of time to discover their intrinsic importance.

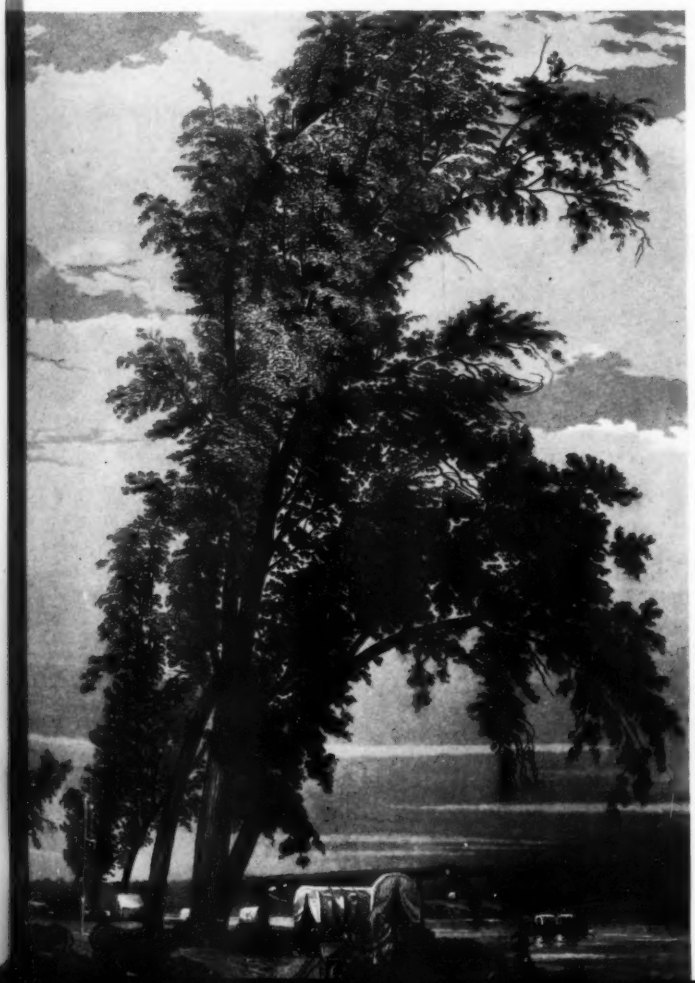
The Timber Land of the Southern Appalachians Was Discovered in 1528 by Alvaro Nunez de Vaca: "There Were Huge Mountains, and Very High Trees."

THE OHIO VALLEY

THE trail across the Alleghenies, discovered by Batts and Fallam in 1671, was quickly used by the fur traders. English traders had pushed through to the Mississippi River by 1700. John Peter Salley, who traveled in the Ohio Valley in 1741, wrote that "In general all the woods over the Land is of great plenty and of all kind." Pierre Joseph Celoron de Blainville, the Frenchman, who traveled from the Lakes down the Allegheny River and the Ohio to its mouth in 1749, was accompanied by a Father Bonnecamp, who had an inquiring eye for strange trees. He saw a "bean-tree" which was undoubtedly a honey-locust, and one day dined with twenty-eight other men in a hollow sycamore. He called our red-bud the "lentil-tree." Christopher Gist, exploring along the "River Mohongaly" for the Ohio Company in 1751, saw hills "extraordinary rich and well timbered." George Washington, when he visited the future site of Pittsburgh in 1753, observed that there was "a considerable Bottome of flat, well-timbered land all around it, very convenient for Building." So the later emigrants found it, and there quickly began the harvest of mixed hardwoods of the Ohio Valley.

The Trees of the Ohio River Valley Were Known to Fur Traders as Early as 1700.

Mormons Ferrying the Missouri River in 1853. The Great Cottonwoods Are the High Point in Frederick Piercy's Engraving, "Council Bluffs Ferry and Group of Cottonwood Trees."



COTTONWOOD COUNTRY

TRAVELERS there were in the Middle West far back in history. De Soto crossed the Mississippi in 1541. Marquette and Joliet went far down the Mississippi in 1673. La Salle went to its mouth in 1682. In 1743, La Verendrye crossed the Great Plains until he saw the "Shining Mountains." Fur traders had by 1800 pushed up the Missouri to the Mandan villages, in what is now South Dakota. But overland travel, up into the country of the cottonwoods, really began with Lewis and Clark, when, in 1804-06, they penetrated to the source of the Missouri and crossed to the Pacific. To them, the cottonwood was a mainstay: at Great Falls, Montana, they built boats from it to push on upstream. "The tree most common" along the Missouri, wrote Lewis, "is the cottonwood." And Captain Benjamin L. E. Bonneville added a picturesque adjunct to overland exploration and travel in 1832 when he started westward with twenty covered wagons. Thus was the way paved for the Oregon emigrants, the Mormons, and the great wave of prairie schooner emigration that continued for nearly a century after. Frederick Piercy, who went with the Mormons in 1853, crossed the Missouri at Council Bluffs. His engraving here reproduced tells the story, scantily treated in his journal: "The company being ready, we drove down to Council Bluffs . . . . at which point we crossed the Missouri."

AN INLAND EMPIRE

LA VERENDRYE crossed the northern Great Plains in 1743, until he saw, for the first time, the "Shining Mountains." But it was Lewis and Clark, even before the fur traders, who penetrated into the Inland Empire of the Rocky Mountains in 1805. Pushing up out of the cottonwood country, they found "the mountains high and rugged, with some pine trees scattered over them." They started across the mountains on horseback. The timber increased, they "reached the top of a mountain covered with pine"; and they came at length to a country overgrown with "almost exclusively pine, chiefly of the long-leafed kind, with some spruce, and a species of fir resembling the Scotch fir." And, finally, going down the western slope, they found "arbor vitae . . . . very common . . . . being from two to six feet in diameter." Zebulon M. Pike, who entered the Colorado Rockies in the same year, met a party of semi-hostile Indians, "made for the woods and unloaded our horses . . . . Early in the morning cut down fourteen logs, and put up a breast-work." Certain it is, however, that the painstaking Lewis and Clark knew and appreciated to a certain extent the store of Ponderosa pine, Douglas fir, western white pine, white fir and larch which awaited the use of mankind in that vast inland empire which they were first among white men to view.

F. E. Colburn

Lewis and Clark First Penetrated the Forests of the Northern Rockies in 1805.

THE GREAT FORESTS

Spanish and English travelers visited the Pacific Northwest before the year 1792, but their interests were centered mainly in the fur trade of Nootka Sound, and it was not until then that Captain Gray, of the American ship *Columbia Redivivus*, discovered the mouth of a river which he named for his ship, and sailed inland. Back at Nootka, Captain Gray told Captain Vancouver, the Englishman, about his discovery, and Vancouver later visited the river and penetrated further inland than had Gray. Then in the winter of 1805, Lewis and Clark paddled down the river from the east, the first to enter the Northwest from that direction and to pass through the greatest forests on the American continent. Captain Lewis improved his time in observing trees and other phenomena of the country and writing descriptions of them. "The trees of a larger growth are very abundant," he wrote; "the whole neighbourhood of the coast is supplied with great quantities of excellent timber. The predominating growth is the fir." And so, from his pen, came probably one of the first records of the fir, later named for David Douglas,—the great staple timber of the Pacific Northwest.

The period of the universal explorer, meantime, was passing. England's explorations into the Northwest had convinced her that plants grew there which would be worthy of introduction. There opened the period which brought its Archibald Menzies and its David Douglas, botanists, whose names are linked inseparably to the trees of the Northwest. With its arboreal wealth catalogued, and its fur-bearing resources well known, the Oregon country lay waiting for the Oregon emigrants to begin the intensive use of its Douglas fir, Ponderosa pine, Menzies or Sitka spruce, and other giant trees, which continues in our own time.

"The Trees of a Larger Growth Are Very Abundant," Wrote Lewis—of the Douglas Fir, Western Cedar and Other Tall Trees of the Pacific Northwest.

Gabriel Moulin

The Big Trees of California Remained Undiscovered Until About the Time of the California Gold Rush in 1849.

California, meantime, long ago discovered by the Spanish, hoarded its storehouse of Ponderosa pine, redwood, sugar pine, and Douglas fir, all but unknown until that day at Sutter's Mill when gold was discovered in '49. Among the millions of acres of California trees, growing quietly, majestically through the milennia since prehistoric time, there stood the Sequoias. Who discovered them it is hard to tell. Perhaps Captain Cermenon, when shipwrecked in Drake's Bay in 1594. Certainly Zenas Leonard, trader and trapper who visited California in 1833, saw them. John Bidwell brought them to light in 1841, and the hunter, Dowd, in 1852. But all these precedents seem little matter, for they stand today in cathedral grandeur just as when Captain Cermenon sailed.

© A. S. Burbank, Plymouth, Massachusetts

From the Settlement of Plymouth to the Present Day, Forests Have Played a Major Role in the Building of America.

THE BEGINNING OF FOREST EXPLOITATION

Abundance of Virgin Forests Supplied Colonists With Most of Their Material Needs

NO ONE knows who felled the first tree on the North American continent. The event is lost in antiquity—buried in the unwritten records of the Red Man, who for unknown centuries before the coming of the white man had supplied most of his material needs from the forests in which he roamed. His cuttings, however, were haphazard and insignificant and were quickly healed by nature. The first primitive lumbering—so far as history records, was that of the Vikings from northern Scandinavia, who in the ninth or tenth century explored the coast of Labrador, where evidences of their use of the forest for shipbuilding have been found. Centuries later, John Cabot and other venturesome explorers cut into the forests along the eastern coast for fuel, temporary shelters while ashore, repairs to their ships and wood samples to be taken back to the Old World.

As with the Indians, these invasions of the forest were sporadic and scarcely noticeable. The real beginning of forest exploitation in the United States dates from the building of the first homes by the immigrants who landed at Jamestown and Plymouth. They came to stay and stay they did. From the time of their landing to the present, the utilization of the forest has been a continuous, expanding drama that has had a deep influence upon our national life and character. Of all our natural heritages, the forests for more than three centuries have been more widely used and have played a larger part in the development of our country than any other resource with the possible exception of the soil. Had there been no forests or only meager tree growth to greet the early immigrants, and to supply their needs in pushing the frontier westward, the course of our whole social and economic history might well have been radically different.

It is interesting to recall that the forests of the New World had a direct influence in stimulating American colonization. Early in the days of exploration, England had been lured by the forest wealth across the Atlantic. Her greatness depended upon her navy. For timbers and for pitch and tar for her ships, she was dependent upon the Baltic countries, which might cut off the supply at any time. America as an English possession would solve that problem permanently. Nor was England unmindful of commercial possibilities incident to America's forest wealth. Her own industries were in need of fuel wood, and the West Indies, Wine Islands and southern Europe were calling for timber products—riven lumber in the form of staves and clapboards; hoops and headings for sugar and rum containers. Here were opportunities to make England independent in respect to supplies of ship timbers and to expand her own sea trade. They were strong factors in determining her to colonize the New World.

THE FOREST FRONTIER

SEPARATED from their homeland by three thousand miles of ocean, the early settlers of America had to wrest their main necessities of life—food, water, shelter and fuel—from the resources of the new land. As if anticipating their needs, forests in plentiful bounty grew all along the Atlantic coast and inland an unknown distance. What lay beyond the forest horizon, they did not know. But for the fulfillment of their immediate needs, forests such as they had never seen or dreamed of were right at hand and forthwith they began felling trees for the building of cabins and the making of furniture, plows, and other implements that would help them sustain life and develop their homes and communities.

It was laborious work, for their tools were primitive compared to those of today. There were no sawmills and boards and planks had to be hewn or riven from the logs or sawed by hand. But nature, they soon found, had provided a wood for every purpose. From the great variety of tree species, they were able to select woods especially suited to their needs for houses, furniture, tools, plows, spinning wheels, fences, bridges and innumerable other things that make pioneer life easier. There were trees adapted to the building of boats; trees that supplied pitch and tar for caulking them; trees whose bark yielded tannin with which they could turn hides into leather. Of fuel wood for warming their homes and cooking their food, the supply right at their doors seemed inexhaustible. There was the white pine, easily worked and adapted to almost every use; the oaks for staves, boat building and the making of containers for fish and salt meat; the red and yellow pine for pitch and tar; the wild cherry and walnut for furniture and gun stocks; the red maple for spinning wheels, plates and bowls; the laurel for weavers' shuttles; various barks for dyes needed to color cloth.

Springs and small streams emerged from the moist floor of the woods to supply clear cold water. Close at hand in the forests were wild animals and birds, fruits and berries in season—theirs for the taking; while the rivers that flowed from the hinterland of trees to the west teemed with fish where they joined the ocean. Thus was the use and environment of the forest stamped upon the American frontier from the day the settlers of Jamestown lighted their first camp fires and hewed out logs to build their first cabins.

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Drawing by H. A. Ogden Showing Colonists at Jamestown Hewing Their Homes from the Forest.

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Agriculture Was a Dominant Objective of the First Settlers. It Called for the Destruction of the Forests and Started a Land-Clearing Movement That Continues to the Present Day.

LAND CLEARING BEGINS

DESPITE the many benefits of abundant forests, there was one respect in which the Colonists found trees a decided handicap, and that was in agriculture. Aside from small clearings made by the Indians and natural openings, the land had to be cleared before the soil could be tilled and crops planted. The heavier the growth of trees, the more herculean the task. But the growing of crops was a necessary corollary of home making and agriculture a dominant motive of the new settlers. They therefore attacked the forest with ax and saw on those lands they wished to turn into gardens and fields. Just as their need of wood for building purposes set in motion an embryo lumber industry in the New World, their need of agriculture set in motion a land clearing that was destined to sweep across the continent, removing the forests from hundreds of millions of acres.

The first settlers learned their agriculture from the Indian and much of their seed was obtained from him. The usual practice was to girdle the trees on the land to be tilled. When the trees had died and the sun could shine through their bare branches, the underbrush was burned, the soil broken and the crops planted. Later, as time permitted, the dead trees were chopped down, stumps grubbed out and the logs rolled in piles and burned. Almost every village had its log rollings—frequent occasions when the men of the village clubbed together to help their neighbor clear his land. If the wood was needed for building, fencing, fuel or other purposes, it was utilized; if not, it was gathered in great piles and burned, the ashes often being used in the making of soap.

The burning of wood gave rise to one of the first industries in America—the manufacture of potash from wood ashes. There was little wood burned on purpose for this product, most of the ashes being derived from land-clearing fires or from domestic fireplaces. The wood ashes chiefly utilized were from hickory, oak, beech, birch, elm, walnut, chestnut, and maple trees. Potash manufacture was carried on during the summer only. The ashes were tamped down in large wooden vats with holes for drainage underneath, and water was poured over them until all the "ley" was leached out, after which the lye was boiled down in iron pots. The pots were then allowed to cool, and the lye salts were pounded out with hammer and chisel.

"Soap ashes" were so important an article of commerce from the early American Colonies that by 1670 the chief wealth of some settlements in New Hampshire and Maine was derived from the sale of potash and fat, which, when boiled together, produced soap. Potash from wood ashes was also used in making "saleratus" for baking, now superseded by baking soda. Charcoal burning was also an important industry in the early days, being made in kilns so constructed as to carbonize most of the wood from combustion of a part. Charcoal was used primarily for fuel, though willow and alder charcoal was used in the manufacture of gunpowder. Because of its peculiar suitability for the reduction of iron ores, much charcoal was also used for this purpose, and "serious inroads were made on the timber in these districts" where iron ore was worked.

THE BIRTH OF FOREST INDUSTRIES

WHILE agriculture was the main motive of the majority of Colonists, the abundance of forests and other natural resources encouraged manufacture and other pursuits. As a by-product of the forest, fur lured men to that business and the fur trader became the pathfinder, opening up trails and resources to the westward. In some regions, notably Maine and New Hampshire, lumbering preceded agriculture and lumbering communities formed the first settlements. Timber products were among the initial shipments from both Jamestown and Plymouth. The lumber industry got its real start in New England where the white pine came into early demand by the English navy for masts and spars. The fine character of white pine, its easy workability, and its durability likewise brought it into almost immediate demand for local manufacture and use with the result that by 1650 the Piscataqua River was the center of the Colonial lumber trade.

As colonization spread along the eastern coast and began to move westward along the streams and trails used by the fur traders, the exploitation of the forests constantly gained momentum. An increasing number of craftsmen were among the immigrants arriving from the Old World. Finding woods well adapted to their crafts and susceptible to their skill and ingenuity they turned the forest into an increasing number of articles. The colonies were outliving their first primitive stages. People wanted larger and better houses, more conveniences and comforts. By virtue of their skill in handicrafts, they obtained them largely from the forests. The home was the workshop where needs and desires were met by hand manufacture of wooden articles.

Entering one of these early Colonial homes, one must have been impressed by the part wood played in its creation and in the life of the family under its roof. Not only the house but its furnishings were largely wood—chairs, tables, benches, beds, cradle, bowls, spoons, tubs, churns. Even the broom used by the housewife was often fashioned from hemlock and pine branches. Every man was his own carpenter, cabinet maker or craftsman. If it were a cradle needed for a new baby or a yoke for his oxen, he selected the best wood and made it in his home shop. The great lumber industry of today had its birth in the homes and villages of those first pioneers. The same may be said of many of the diversified wood-using industries which have contributed so greatly to the development of our country.

By the close of the seventeenth century, the new world pioneers had become rooted in the American wilderness. Ax-made openings in the forest dotted the coast from the Carolinas to Maine and inland along the rivers almost to the Appalachian Mountains. These clearings symbolized not only the making of a new and vigorous race but the beginning of a commerce destined to carry the products of America's forests into all parts of the world. The forest had given birth to four important industries—lumbering, shipbuilding, the production of naval stores—pitch, tar rosin and turpentine—and the manufacture of potash.

Courtesy The Lexington Historical Society.

Forest Industries of Today Had Their Beginnings in the Homes of the Colonists, Who Were Dependent Largely on Wood to Meet Their Pioneer Needs for Houses, Furnishings and Tools.

NAVAL STORES

ONE of the reasons given for the settlement of Jamestown was the hope of England to develop a source of pitch, tar and turpentine. The development of a naval stores industry in the southern Colonies languished until near the close of the seventeenth century. In the meantime, a considerable trade in naval stores developed in New England from the Plymouth Colony. The production was not large, however, since New England pines were low in the yield of "pitche."

By the close of the seventeenth century, the high yields of the southern pines in pitch, tar, rosin and turpentine began to be taken advantage of and extraction in New England gradually became negligible. The southern industry was greatly stimulated by encouragement from England. Between 1700 and 1718, for example, shipments of tar alone from the Colonies to England jumped from 177 to over 82,000 barrels. From that period on the southern states have not only kept their supremacy in naval stores production but they have maintained a virtual monopoly of it in America, because the southern pine forests are so rich in resin that no other forest region in the country can successfully compete with them. Through three centuries these southern forests have maintained the naval stores industry, one of the most important in the southern states, and have given the United States the distinction of leading the world in the production of naval stores.

From Frank Leslie's Illustrated, September 29, 1866.

By the Settlement of Jamestown, England Hoped to Develop an Independent Source of Pitch, Tar and Turpentine. But It Was Almost One Hundred Years Before the Naval Stores Industry in the South Began to Prosper.

THE BIRTH OF DIVERSIFIED INDUSTRIES

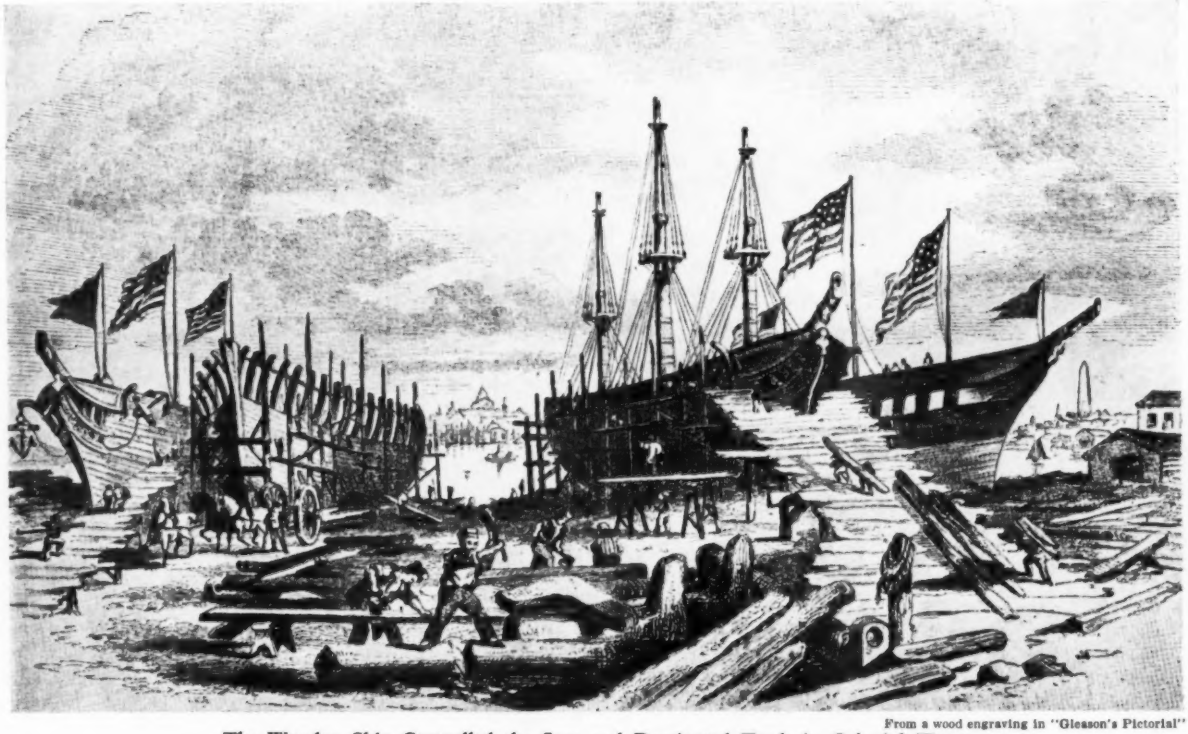
THE prosperity of the Colonies was dependent in large measure upon the development of commerce. The forests furnished the raw materials for the building of both domestic and export trade. Wooden ships carrying American timbers to the tropics brought back cargoes of molasses upon which was built New England distillery industries. The making of furniture, vehicles, plows and a great variety of wood products; the extraction of tannin from oak and hemlock bark; the abundance of fuel wood for the making of brick, iron, glass and pottery; the establishment of the waterpower sawmill—these and a host of other forest uses all furthered the diversity and volume of American manufacture.

The sawmill was the first commercial harnessing of waterpower in America. Dating back to about 1631, the application of power sawing speeded up tremendously the production of Colonial lumber. But the influence of the sawmill did not end there. Clark in "The History of Manufactures in the United States" says—"These little establishments performed the greatest variety of service. Not only did they saw lumber and grind grain and full cloth, but they ground rags, plaster, powder, malt, flaxseed, chocolate, mustard and tobacco." Thus did the virgin forest of Colonial days bring into being, either directly or indirectly, most of the industries that in later years were to make the United States the greatest industrial nation of the world.

THE BEGINNING OF SHIPBUILDING

IN Colonial times transportation was largely by water and the growing commerce of the New World called for ships. Early lumbering followed the rivers on which logs and hewed timbers could be floated to ports of shipment. The demands of distance transportation both for foreign and coastwise trade soon gave rise to an American shipbuilding industry. This was encouraged by England not only in the interests of Colonial development but to supply ships for its own needs. Probably self-interest was the stronger factor because the British soon found that ships could be built in America, with wood so accessible and abundant, much cheaper than in England. The local fisheries and other commerce along the eastern coast also called for an increasing number of ships.

During the first fifty years of settlement, Portsmouth on the Piscataqua River, where lumbering operations had centered, became the leading shipbuilding point in America. By the last quarter of the seventeenth century, New England shipbuilders were receiving orders for a score or more of ships a year. But early shipbuilding was not confined to New England. In the first one hundred years of settlement, shipbuilding plants sprang up at favored points along the coast from Maine to Virginia and the building of wooden ships grew to be a large industry, flourishing until the advent of the steel ship in the last half of the nineteenth century.



From a wood engraving in "Gleason's Pictorial"

The Wooden Ship Controlled the Seas and Dominated Trade in Colonial Times. America's Abundant Forests Gave Rise to a Shipbuilding Industry a Few Years After the Mayflower Landed. Above—Early Day Scene in an East Boston Shipyard.

THE BROAD ARROW

THE relation between forests and ships gave rise to one of the most interesting chapters in the early forest history of America. Late in the seventeenth century, England attempted to reserve for the use of the Royal Navy the choicest timber in the New England territory and to prevent its being cut except with royal consent. The reservation was first written into a charter in 1691 consolidating most of the New England colonies into "The Province of Massachusetts." The royal claim was not a blanket one applying to all timber on the land, but it singled out only the largest trees—those twenty-four inches in diameter at a point twelve inches from the ground.

England prescribed severe penalties for the cutting of the "royal trees" and in order that there might be no mistakes in identifying them, she appointed officers to mark each reserved tree with the Crown's symbol—the Broad Arrow. This preemption of the choicest trees of the forest by the mother country did not rest at all well with the New England woodsmen who had come to look upon trees on the public lands as free for the taking. And they proceeded pretty much to follow that theory. England not only was unsuccessful in maintaining her "Broad Arrow" claims but her assumption of Crown ownership to all resources not privately owned created a bitter resentment that eventually found its outlet in the American Revolution.

Photograph by John D. Cress, Seattle

The American Frontier, With Its Wilderness and Free Soil to Conquer, Beckoned the Adventurer and Settler for Almost Three Centuries.

THE PUBLIC DOMAIN

How America Through Its Federal Congress Has Dealt With The People's Heritage of Land Resources

THREE CENTURIES OF FRONTIERS

THERE has been a frontier to beckon the adventurer, a wilderness to conquer, and free soil to subdue for nearly three hundred years of American history. This has been so from the time the "Sarah Constant" sailed into the waters of Virginia with the first Colonists in 1607 until Theodore Roosevelt in 1908 called the first assembly of State governors to consider the inventory of waning natural wealth. Each century has contributed historic names which mark the contraction of the frontier: in the seventeenth, John Smith and Raleigh in Virginia, the Pilgrims in Massachusetts, and Champlain and LaSalle along the Great Lakes; in the eighteenth, Escalante and Dominguez in Arizona and Utah, Daniel Boone in Kentucky and Gray on the Columbia; and in the first half of the nineteenth, Lewis and Clark in Oregon, Pike in Colorado, Sibley in Oklahoma, Hunt in the Dakotas, Long and Bonneville in the Rocky Mountains, Jebediah Smith in the Great Basin, Walker and Fremont in California, and Kit Carson in New Mexico. The last half of this century marked the climax. The discovery of gold in California, the Civil War and the period of construction immediately following; the Indian Wars, and the settlement of the vast public domain of the West, crowded within the short space of fifty years a sequence of romantic events without parallel in the making of the American State.

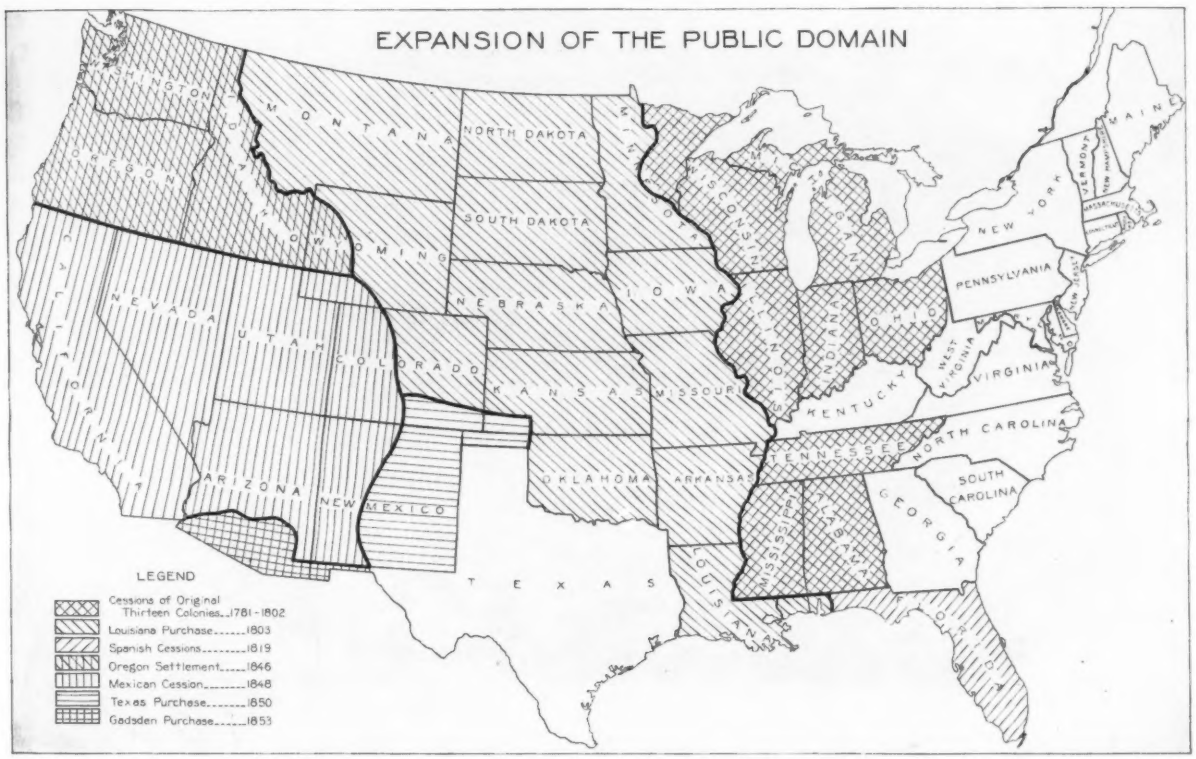
ORIGIN OF THE PUBLIC DOMAIN

WHEN the Union of States was formed from the Original Thirteen Colonies in 1776 the people as a nation owned no land in common. There was no Federal public domain, that is, public lands owned by the United States and subject to sale or other disposition under the control of the central government. Each State became the owner of the vacant and unappropriated lands within its borders as successor to the grants and charters to the Colonies from the Crown of England. Much of these State-owned lands lay west of the Appalachian Mountains and extended to the Mississippi River.

These conditions and the interests of those States which did not share in the original charters and grants induced Congress to persuade the States to cede their public lands to the Federal Government. New York State was the first to transfer its lands in 1781, followed by Virginia, Massachusetts, Connecticut, South Carolina, North Carolina and Georgia. By 1802 the nucleus of the Federal Public Domain was created through the cession of nearly 260,000,000 acres of land comprising the present States of Ohio, Indiana, Illinois, Michigan, Wisconsin, Tennessee, the eastern half of Minnesota, and the greater part of Alabama and Mississippi. Not only was a vast estate established for the common benefit of all the people and for the exercise of national authority, but a bond of union was created at a critical time in the life of the new republic.

EXPANSION OF THE PUELIC DOMAIN

THE Federal territory acquired from the Original States expanded enormously through purchase, conquest and treaty. The United States obtained direct title to the vacant and unappropriated lands included in the vast areas ceded by France, Spain, Mexico, Texas and Russia, and as recognized by Great Britain in the Oregon Country. The Gadsden Purchase from Mexico in 1853 of borderlands in Arizona and New Mexico finally completed the acquisition of the great public estate. Exclusive of the Alaska Purchase from Russia, this Federal Public Domain, in its entirety, embraced roughly 1,500,000,000 acres or about seventy-five per cent of the continental area of the United States. The States of the Mississippi Valley and of the far West formed from this great territory received grants of public lands upon admission to the Union, but in all other respects acquired no title to the great areas of the public lands within their borders, and obtained no right to the exercise of any power over them. The public lands became and remained, pending disposition, the exclusive possession of the people as a whole, who, by a constitutional provision, placed upon Congress the responsibility of their disposal or the regulation of their use. This responsibility has continued with Congress down to the present day.



Historical Steps by Which the Public Domain Became a People's Heritage of a Billion and a Half Acres.

POLICY OF DISPOSAL

THE Federal stewardship of the public lands, assumed formally upon the ratification of the Constitution in 1789, comprised a vast wilderness rich in natural resources. Settlers and a population were needed to develop this wealth. At the end of the succeeding one hundred years the frontier had disappeared, the population had grown from four million to sixty-five million, and the country had been settled from coast to coast. The Federal land policy patterned after that of the Thirteen Colonies, and of England, France and Spain, was one of disposal. The Government's responsibility was conceived to be, not that of an administrator, but rather that of an agent through whom title could be passed to private ownership. There was no thought that permanent public ownership of land was a Federal function, beyond the acquisition of tracts for national defense, or for a similar immediate and utilitarian purpose. At first areas as large as townships were granted to individuals or companies who would bring in the settlers and resell the lands in small tracts. Gradually, and particularly after the Civil War, when settlement advanced rapidly across the Great Plains and the Rockies to the Pacific, a system of land laws was developed for the alienation of every type and class of land—agricultural, timber, mineral and grazing. Land disposal at this time progressed at an ever increasing rate and for an ever expanding range of purposes.

Photograph by C. W. Gale

Through the Homestead Act, Signed by Abraham Lincoln May 20, 1862, Over 500,000,000 Acres of the Public Domain Passed to Private Ownership. Above—The Daniel Freeman Homestead in Nebraska—the First Entry Under the Act.

EXPLOITATION AND SETTLEMENT

CONGRESS after one hundred and fifty years of custody has disposed of more than two-thirds of the entire original area of public lands—all lands in the United States except the Original Thirteen Colonies and Texas—for the benefit of individuals, corporations and the new States. About one-fourth has been reserved through the establishment of reservations for the conservation of their natural resources or for specific Federal purposes such as national defense. Less than ten per cent of the original Domain remains unappropriated—but so overgrazed and exploited as to be of exceedingly low value.

Of the lands passed to private ownership, disposal has been largely to individuals for settlement and development. The Preemption Act of 1841 gave to settlers the right to purchase 160 acres; the Homestead Act of 1862, the most significant of all the many land laws, awarded 160 acres free. The rapid development of the rich prairie regions followed the Homestead Act. Later, in order to encourage homesteading in the more arid areas farther West, homestead units were increased to 320 acres and eventually 640 acres.

Other legislation such as the Desert Land Act of 1877 and the Timber and Stone Act of 1878 continued liberal provisions for disposal. Too, millions of acres were granted to corporations for the development of pioneer transportation systems, chiefly the transcontinental railroads, and to States for the support of schools and other public purposes upon admission of each new State into the Union. The most recent chapter of Public Domain policy was written in 1935, when the remaining vacant lands were withdrawn from entry pending their classification for grazing control and other conservation purposes.

THE BEGINNING OF LAND REFORM

IN the period of free exploitation, there was at no time a consistent attempt to pursue a policy of wise land utilization. The motivating influences were a desire for revenue on the one hand, and for settlement on the other as each new State was created. There was no classification of the land upon which intelligent legislation could be based; the administration was governed by the dictates of expediency. Fraud was inevitable, notably in the disposal of so-called swamp lands and of timberlands. Moreover, ill-adapted legislation providing for the occupancy of arid and humid lands alike, increased the difficulties. Ease of acquisition led to speculation, monopoly and fraud; too often the free settler became a tenant or merely a dummy for commercial interests to secure title to the lands.

Gradually the realization developed that free lands were no longer limitless and that the laws were inadequate to safeguard the interests of bona-fide settlement. Some laws were repealed, and others revised. Importantly, provision was made in 1879, almost a century after the Federal Government became proprietor of the Public Domain, for classifying the public resources as a first step before disposing of them. Nevertheless, the Timber and Stone Act of 1878, under which great tracts have been fraudulently acquired, continued in force despite demands for its repeal. In retrospect it may be said that the lack of a constructive public land policy was largely inevitable in the development of a wilderness country under the pressure of a fast-expanding population constantly advancing westward. Behind it all was the popular will that a citizen was entitled to free land, and its very abundance, seemingly limitless, fortified this philosophy.

Millions of Acres of the Nation's Finest Timber Passed into Private Hands by the Fraudulent Use of the Homestead Act. Here Is an Early Homestead in Idaho, Abandoned After the Timber Was Acquired.

A Section of the Old Yellowstone Timberland Reserve—the First Reservation of Public Lands for Forest Purposes. The Distant Mountains Are the "Tetons" Which Today Form the Teton National Park.

RESERVATION AND CONSERVATION

THE early nineties of the last century witnessed not only the official elimination of the frontier from the Federal census reports but, significantly, the introduction of a national policy of conservation. For the first time the principle of public ownership or regulation of the Federal natural resources became established policy. As long ago as in 1817 reservations of live oak for the Navy had been established though later abandoned; nevertheless, this action marked no considered national policy. First acceptance of Federal administration of natural resources dates from 1872 when the Yellowstone National Park was reserved as a "pleasuring ground." This marks the genesis of the National Park system although no new parks were created until 1890. There was no definite action to conserve public natural resources for their economic values until the Yellowstone Timberland Reserve was established in 1891 by President Harrison. The upbuilding of the present system of National Forests followed the Act of March 3, 1891, authorizing the withdrawal of public lands for forest reserves. Acquisition was accelerated by Grover Cleveland and notably by Theodore Roosevelt.

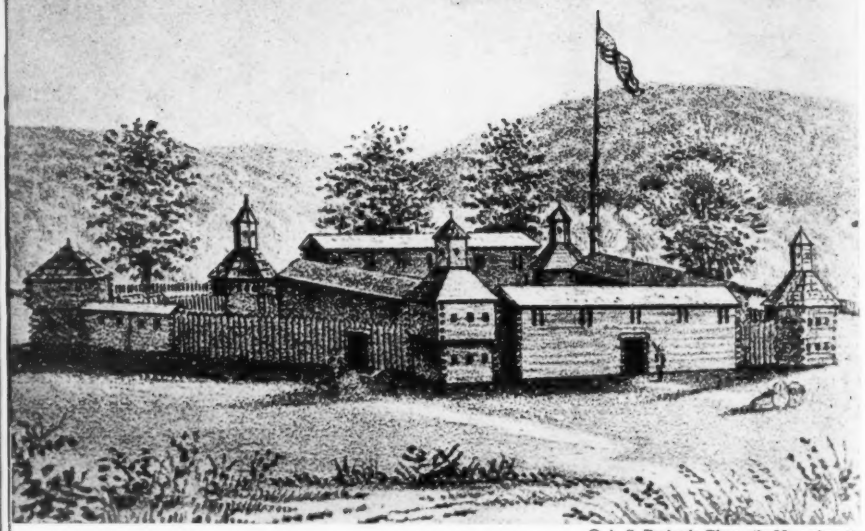
Today somewhat less than half a billion acres are nationally owned in one form or another. These public properties are either under active Federal administration as National Forests, National Parks and Monuments, Indian and Military Reservations and Wildlife Refuges, or are held in reserve to meet diverse public needs for range and soil control, reclamation, power, minerals and other national purposes.

THE NEW PUBLIC DOMAIN

WHEN the rich heritage of the virgin public lands in the thirty States of the Union passed to private hands it was presumed that the Federal stewardship had been discharged. The opportunity for free competition in the exploitation of unsurpassed natural resources brought to this nation a complacent sense of well-being. But it was unappreciated that this wealth was derived from the fleeting exploitation of capital assets, the stored natural growth of centuries, and not from the sustained income capacity of the soil. It was an economy based on the satisfaction of the wants of a fast-growing population readily met by the successive establishment of fugitive enterprises as the frontier retreated.

Today millions of acres of once rich public lands passed out by Congress for settlement and home building are coming back into public ownership with forests denuded, soils eroded and natural resources "mined out." These are tax-delinquent lands—a burden upon communities and states and a challenge to local prosperity. Great sections of lands no longer contain natural wealth adequate to the support of populations. Thus a new Public Domain is rapidly in the making, but one quite different from that inherited by the American people as a legacy of the ages. It is estimated that over 50,000,000 acres of land, wrecked of its resources and its productive capacity are tax delinquent and in course of reversion to public ownership. Millions of acres more still paying taxes pending completion of exploitation are a national liability because responsibility for the restoration of depleted natural wealth—the problem of the new Public Domain—must inevitably fall upon the public.

Millions of Acres of Depleted Land Abandoned by Its Owners Have Come Back to Form a New and Burdensome Public Domain. View Shows Tax-Reverted Land in Michigan.



© A. S. Burbank, Plymouth, Massachusetts

In the Sweep of the American Frontier Westward, the Log Fort Was the Herald of a Coming Age of Wood. An Old Drawing of Fort Washington, Built in 1789 Where Cincinnati Now Stands.

THE AGE OF WOOD

THE ADVANCE HERALD

DURING the eighteenth century, colonization moved doggedly westward, lured always by free land and by a spirit of wilderness conquest. The hunter and the Indian trader were followed by the settler; they in turn by the craftsman and the industrialist. With them went an expanding exploitation of the soil and the forest. By the turn of the century, the eastern half of the country to the Mississippi River was opened up to settlement and trade. During this period, the pioneer's exploitative influence upon the forest was far outweighed by the influence of the forest upon the pioneer. The further he penetrated into the wilderness, the more removed he became from old world traditions and influences and the more he took on the ruggedness and independence of his forest-Indian environment. If in the end he mastered the wilderness, the wilderness in turn moulded him and those who came after him into a common type that was to be uniquely American in its social and economic development.

In his conquest of the new land, the pioneer's contact with the primitive Indian was at first helpful and then retardant. Almost every advance of the frontier westward was along Indian trails and by way of Indian settlements favorably located with respect to the resources of new territory. Indian trading posts became the advance markers of progress to be replaced by log forts or stockades when the time came to wrest the land from the Redskins. In the broad sweep of the frontier westward, the stockade in the forest and on the plain was not only the outpost of exploitation but the herald of a coming age of wood in the making of the new nation.

PILLARS OF WOOD

IN the history of America's use of its forests, the nineteenth century stands out as the most colorful. The American forests supplied "the wooden pillars" for the building of a new civilization and a new nation. As the tide of emigrants surged westward and spread out upon the land, settlements grew into villages and then into cities, erected largely with lumber. All the large cities today east of the Great Plains — New York, Philadelphia, Cincinnati, Chicago, St. Louis — have grown from lumber-built towns.

The new nation was tugging at its expansion belt. Population was doubling every thirty years. The belief that the forests were inexhaustible was still in the ascendancy and development of the country was the great national goal. The structural material of the time was timber and the ax and the sawmill were the forerunners of development. The forests supplied not only the main building material for the new settlers and the growing towns but with the coming of the industrial period following the War of 1812 they furnished the raw wood that enabled industries in increasing numbers to spring into being. During the half century 1800 to 1850, America's demand upon its forests increased more than three times and the consumption of lumber leaped from fifty-five to 235 feet a person. New York and Pennsylvania had surpassed Maine in the amount of lumber cut, and lumbering had become a leading industry in the Central and Lake States.

As Settlement Hewed Its Way Westward, Lumber-Built Towns and Cities Marked the Advance of Progress. Below Is a Picture of Cincinnati in 1841.

A Klauprech & Menzel's Print.

Oregon Trail Memorial Association, Inc.

The Covered Wagon, Built of Wood, Enabled the Emigrants to Settle and Span the Prairies and to Usher in the Greatest Forest Using Era in History.

THE COVERED WAGON

TO a young growing nation, spreading out over a vast territory and building farms, industries and cities, transportation was in large measure the life of trade and national expansion. Until well into the nineteenth century, transportation in America was mainly by wagons and boats, in the building of which the forests supplied the needed materials. That both shipbuilding and vehicle manufacture eventually became large industries using great quantities of wood is of far less significance than the influence of readily available boats and wagons upon the development of the country. With wood everywhere at hand, transportation by water or wagon trail was quickly solved and both emigration and development speeded up.

There is no greater drama in American history than that of the covered wagon and the part it played during the nineteenth century in wheeling the frontier westward over the Appalachians, across the plains and the Rockies to the western coast. For hundreds of thousands of emigrants—men and women who first built the nation—it became a home during weeks and months of arduous travel to new lands. Following the California gold rush of '49 it linked the East with the West and opened the doors for the surge of settlement that brought about the greatest forest-using era of our history.

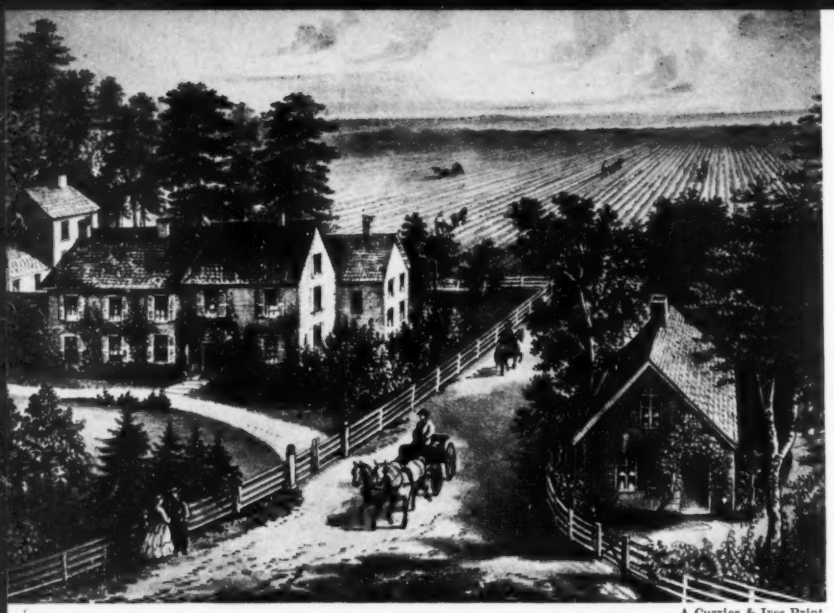
THE IRON HORSE

THE development of the steam locomotive and the steel industry during the first half of the century gave a great stimulus to settlement of the country and to the development of industries. Not only was the colonization of new regions speeded up but commerce between cities and states was quickened. This commerce was built largely upon an increasing use of wood from the forests, which was an essential material in virtually every industry and every field of development.

As wood had pioneered water and wagon transportation, so it did the building of railroads and the early age of the "Iron Horse." The first steam locomotive in America was run on wooden rails and fueled with wood. From the very beginning of railroading in this country and all through the period of its rapid and far-flung development ever increasing quantities of crossties, bridge and trestle timbers and wood in different forms were required for maintenance of way, shop and rolling stock purposes. Each year brought a growing demand for high-grade lumber, both hardwood and softwood, for the construction of freight and passenger cars. By the close of the century this use of wood alone exceeded a billion board feet annually. Although, in recent years, the substitution of steel for wood for car construction has been greatly curtailed, no satisfactory substitute has been found for the wooden crosstie, of which the railroads of the country today use one hundred million annually.

The Driving of the Golden Spike at Promontory Summit, Utah, May 10, 1869, Joined the East and the Far West by a Steel Trail and Marked a New Era in National Development.

Courtesy, Oakland "Tribune"



A Currier & Ives Print.

The Settlement of the Prairies During the Last Quarter of the Nineteenth Century All But Drained the Lake States of Their Magnificent Forests.

THE PRAIRIE FARMER

THE prairie farmer was a greater factor in the exploitation of America's forests than most people realize. Checked only temporarily by the Civil War, the tide of emigrants spread over the rich soils of the eastern plains within the course of a few decades. For the most part it was treeless land and settlement called for tremendous amounts of lumber to be shipped from distant forest regions. The prairie requirements were met largely by the white pine forests of the Lake States and the hardwood forests of the Central Appalachian Region. Hauled by rail or water to points along the Mississippi, the lumber was transported overland to its destination.

The voracious appetite of the Prairie States during their fifty years of feverish development had a marked influence upon the course of American lumbering. Added to the demands from the East and the Central States, it all but drained Michigan, Minnesota and Wisconsin of their original forests of white pine. Sawmills sprang up like mushrooms. Ever growing demands for lumber spurred forward the development of faster methods of logging and milling. Men became lumber kings almost overnight. By 1870, Michigan became the leading lumber state of the union and a decade later, Chicago the greatest lumber port in the world. By the end of the century, the nation's consumption of lumber had increased in fifty years from five to over thirty-five billion feet, the end of the Lake States forests was clearly in sight and the lumbering industry was marshaling its mills in the southern pineries.

THE DEMAND FOR HEAT

UNTIL well after 1850, wood was the principal fuel used in America. Most of the consumption was for domestic heating. Few people realize the tremendous volume of forest growth that has been required to warm the hearths of American homes. It far exceeds the lumber cut. From 1630 to 1930, the forests of the United States, it has been estimated, supplied 13,250,000,000 cords of fuel wood, or three times the volume of wood cut into lumber during the same period. The drain upon the forests for fuel wood reached its peak in the last half of the nineteenth century, during which as much wood was burned for fuel as during the 250 years preceding. When coal came into general use for both domestic and industrial purposes, the use of wood fell off, but even today the volume of fuel wood consumed is practically equal to that of lumber.

Although coal greatly relieved the fuel wood drain upon the forest, the mining of coal and other minerals which developed to large proportion following 1880 created a new demand for wood. The mining industry in all its branches was and still is dependent upon a supply of wood in the form of round and sawed timbers and lumber, not only for use under ground but above as well. In coal and metal mines wood is used for props in temporary workings and for sets in gangways or other principal openings. These consist of a cross bar and two legs. It is also employed for brattice, stoppings, mine ties, shafts, headboards, caps, sprags, wedges and for many other purposes.

The Development of Coal Mining Following the Civil War Relieved Somewhat the Fuelwood Drain Upon the Forests, But the Extraction of Coal in Turn Called for Great Quantities of Wood. The Photograph Shows a Timbered Tunnel in a Pennsylvania Coal Mine.

Paper Is One of the Forest's Greatest Contributions to American Life and Industry. View in a Modern Paper Making Plant.

Courtesy, West Virginia Pulp and Paper Company.

WOOD FOR PAPER

OUT of America's forests have come many new and large industries. None has had a greater influence upon the social and economic life of the nation than that of paper making. Until 1859 linen and cotton rags were the raw material for paper making in the United States as well as in Europe. America's supply of rags was largely imported, and there were periods of great scarcity accompanied by serious paper shortages. During the Revolution American officers were often unable to obtain the insignificant amount of paper needed for orders.

With the increase in population during the nineteenth century, the demand for paper grew constantly. A substitute for rags as raw material became imperative and inventors turned to the forests—still thought to be inexhaustible. The first successful use of wood pulp in the making of paper was by Hugh Burgess in the vicinity of Philadelphia just before the Civil War. From that time, the exploitation of the forest for pulp wood and the production of paper increased by leaps and bounds. By the close of the century, consumption of wood pulp exceeded 1,000,000 tons. The ever increasing use of paper and wood fiber products, including the relatively new products of rayon and cellophane, called for over 9,000,000 tons of wood pulp in 1929.

Wood today is the preeminent raw material for the manufacture of paper, boards and other fiber products. Though wood pulp was first used as a substitute for rags in paper making only seventy years ago, today about eighty-five per cent of our paper has its origin in the forests.

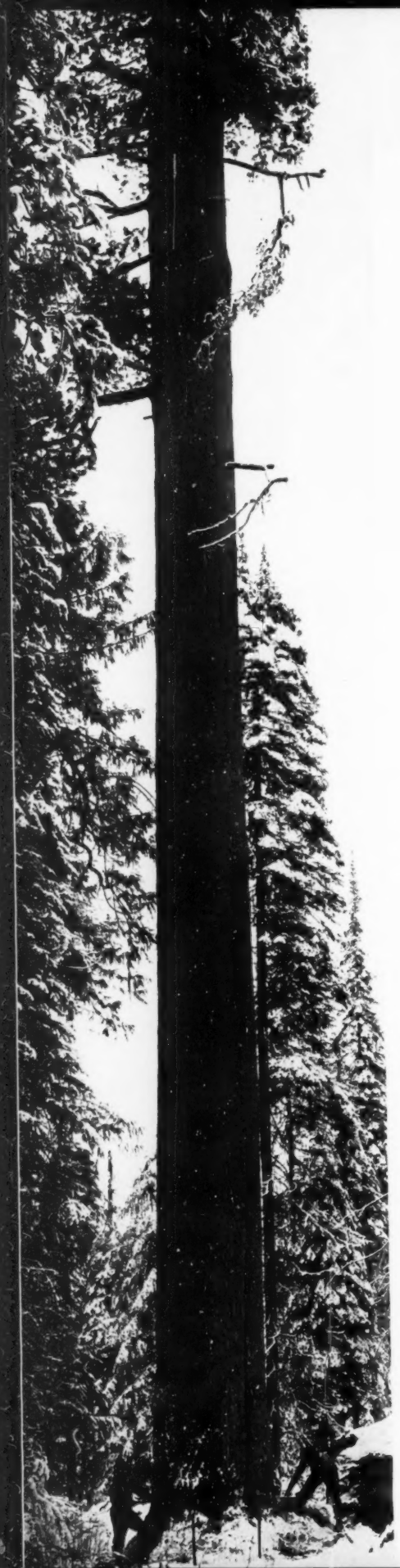
THE AFTERMATH

THE period 1860 to 1910 marked the heydey of America's age of wood. The frontier passed into history and the whole country teemed with settlement and industrial development. Wood was the all-use material at hand and as towns, cities and industries grew and multiplied the forests were called upon to meet the nation's demands. Lumbering swept through New York, Pennsylvania, the Lake States and into the South; then it leaped the plains to the forests of the Far West. From eight billion feet in 1860, America's consumption of lumber rose to forty-five billion feet in 1907. That marked the peak, from which it gradually declined to less than twenty billion feet in 1934. But the twenty years 1890-1910 witnessed over 800 billion feet of standing forests converted into lumber.

Probably never in the world's history have human demands in such great volume and swift fulfillment fallen upon virgin forests. Considering the spirit of wilderness conquest and the national concept of development with which the American people were imbued, wholesale destruction of the forests was inevitable, and wasteful and destructive lumbering grew up as a part of the American system of social and economic growth. By the time the theory of forest inexhaustibility became clearly fallacious lumbering methods were too deeply fused with capital investments and industrial competition to be changed overnight. Thus America's magnificent forests fell before an economic system which had no philosophy of conserving natural wealth, and it left in its wake millions of acres of land largely stripped of resources necessary for human habitation.

Forest Materials Pioneered the Development of Almost Every Great Industry, Even Oil. Photograph Shows Wooden Derricks in Opening of a Petroleum Field in California.

Courtesy, Long Beach, California, Chamber of Commerce.



THE STORY OF LUMBERING

SPANNING A CONTINENT

THE sawing of lumber began 300 years ago at many points on the Atlantic Coast where colonization began. The first development was in New England and New York, which possessed not only ample waterpower but also an abundance of white pine. The quest for this highly prized species determined the principal course of the lumber and timber industry for more than 200 years. The profits from its conversion, added to other advantages, helped some States and cities to early dominance in wealth and population.

As the regional supply of virgin white pine declined, the principal center of production slowly shifted from Maine to New York, to Pennsylvania, and thence to the Lake States, where Michigan was the chief producing State of the country from the Civil War to 1890, followed by Wisconsin to 1904. With the decline of Michigan the supply of white pine also declined, and the vast yellow pine forests of the Southern States from Virginia to Texas became the next principal source of supply. Southern pine lumber dominated the markets of the Northeast until about 1920 when the virgin Douglas fir of the Pacific Northwest shipped through the Panama Canal, undermined its supremacy.

Washington has been the leading State in production since 1905, with the exception of one year (1914) when Louisiana was foremost. The manufacture of oak and other hardwood lumber also shifted from the Northeast to the Central and Lake States and then southward along the Appalachians to the Lower Mississippi region, trailing the advance of the softwood industry. Thus the lumber industry spanned the United States from ocean to ocean, supplying the building material which made possible the development and occupation of all parts of the country, even to the treeless plains. There could be no pause in its migration, for its raw material was virgin timber. From small beginnings it grew to be one of the foremost of manufacturing industries.

The peak of lumber production occurred just before 1909 when nearly 50,000 mills were in operation, employing half a million men, and the cut was estimated to be forty-six billion board feet. During three hundred years the aggregate of all lumber sawed was over two trillion board feet. More than half of this gigantic quantity was cut since the twentieth century began. That fact indicates not only the increased demand of a large population, but also an increase in the number and size of the mills, the power used, and the application of ever more ingenious and efficient machinery.

Four-fifths of this lumber came from eastern forests. Practically half of it was southern yellow pine and northern white pine, combined, and a quarter came from eastern forests of hardwood. But in 1929, a single recent year, forty-three per cent of our lumber was cut in the West. Michigan and Washington together have accounted for about one-eighth of all the lumber cut, and at this time they are about even in aggregate cut. There is an important difference, however, the bulk of the Michigan timber has long since disappeared while that of Washington will probably last for several more decades. The aggregate cut of lumber as it came from the mills might reasonably be valued upward of $30,000,000,000. In some single years the value of the cut was $1,000,000,000.

The Quest for White Pine Determined the Course of American Lumbering for Over 200 Years.

THE AGE OF WATERPOWER

THE early Colonists were few in number and generally poor. Lumber was not only the best possible material for pioneer construction but also a commodity which brought ready cash when exported to the old country and the West Indies. Both the English and the Dutch were accustomed to pit sawing, not to sawmills, but they discovered that hand labor was far too slow and costly for their need, and power mills were soon established. Sawmills were operating in America even before they were introduced into England. The first sawmill to be erected in the New World is thought to have been at the town of Berwick, Maine, in 1631, only a few years after the Pilgrims landed.

These early American mills were very small and primitive, consisting of an old-style water wheel connected by a crank with a rectangular "sash" sliding in vertical grooves. A single vertical saw blade was strained taut in the sash. In the earliest mills the log was moved by hand toward the saw after each stroke. Owing partly to the lack of capital for building dams and sluices and the native ingenuity of the pioneers the water wheel was commonly located on a small stream of considerable fall at a point near navigable water, for water-ways were the only means of transporting heavy commodities for any considerable distance. The trees were felled and chopped into logs by axmen, as few saws were available. When the timber of the locality was used up, or when the stream failed the mill was moved to another power site. Such a mill, tended by a man and a boy, usually sawed no more than 500 feet of pine in a day, and considerably less of oak. Throughout the Colonial period the average production per saw was reckoned at no more than 1,000 feet a day. To mills like these the forests were indeed inexhaustible.

United States Forest Service

Primitive Mills of the Type Shown Here, With Vertical Saws Driven by Water Power, Supplied America With Lumber Until After 1820.

LOGGING WITH OXEN

THE pioneer lumberman with his limited equipment was working on relatively large and heavy timber. It was common practice to use the butt logs and leave the rest. White pine averaged 130 to 160 feet high, with an occasional veteran 250 feet high and eighty inches diameter. To haul the logs to the mill required far more power than men could exert. Oxen were commonly used to "skid" the logs, sometimes as many as six yoke hauling together. Oxen, though slow, were powerful and dependable if well handled. The saga of lumbering is replete with exploits of a mythical character, Paul Bunyan, and his prize ox named Babe. The trouble with Babe was that whenever he drank, the water wheel stopped, and if he snorted they had to rebuild the mill. While there are traces of exaggeration in these sylvan anecdotes, they serve to illustrate the esteem in which power was held by the logging fraternity. Power was the prime requisite for the rough and ready solution of their engineering problems.

From Harper's Weekly, September 25, 1858

For Well Over 200 Years of American Lumbering, Oxen Supplied the Power For Hauling Logs From the Woods.

Ballou's Pictorial, December 4, 1858

Streams Furnished Not Only Power For Sawing Lumber but Also For Driving Logs to the Mills.

THE RIVER DRIVERS

PRACTICALLY all early lumbering was on rivers. Sooner or later in each river valley, the timber near the mills was used, and it became necessary to send men to the heads of the streams for suitable logs. The current of the streams was used to transport the logs to the mills. Small tributaries were dammed to back up enough water to float the logs. Pine would float but most hardwoods would not. The logs were cut during the winter, marked with the owner's brand, and hauled to yards on the stream banks, or piled on the ice. When the ice went out in the spring the logs went with the flood waters.

The river drivers went with the logs to keep them from stranding and to break jams whenever they might occur. Riding the floating logs in "white" water, balancing themselves with pike-pole or peavy, they often performed acts of heroism in serving the interests of their employers and in rescuing endangered comrades. A sport of the river men was to spin a floating log by treading it with their heavy spike-shod boots. This was known as "birling."

The mill towns awaited the arrival of the drive with mingled hope and apprehension. Half a hundred husky woodsmen, long deprived of town luxuries, and with a winter's wages to spend, might be welcome guests to the merchants, but embarrassing to those whose duty was to enforce law and order.

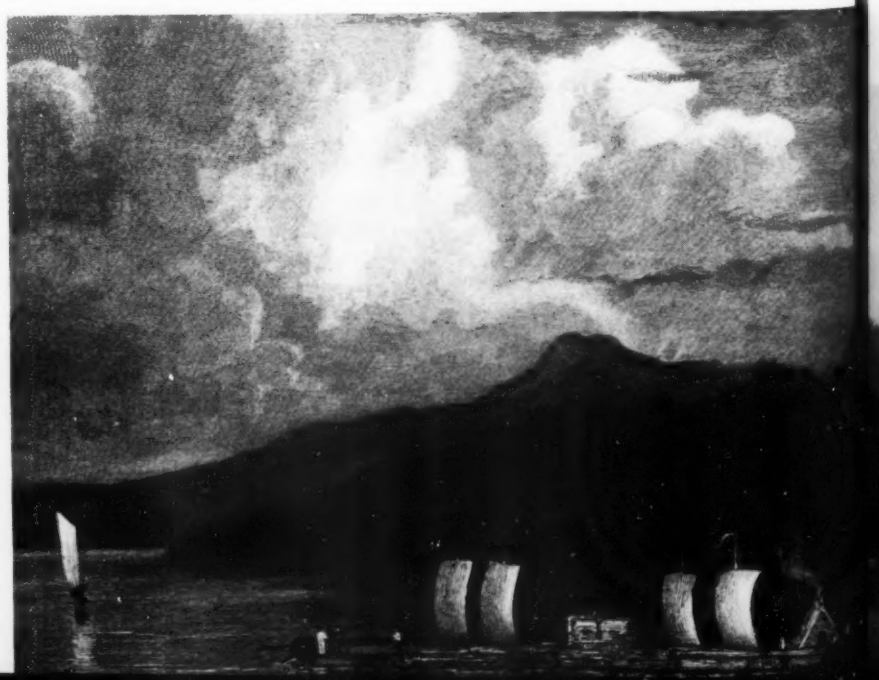
DAYS OF RAFTING

THE rafting of lumber preceded the driving of logs by a quarter of a century. Rafting could could be conducted only on rivers of large flow. These rivers were the transportation means of moving lumber from the mills to the markets. The earliest rafting reported was on the Delaware and on the upper Hudson, where in 1790 the product of the Glens Falls mills was floated to Albany. On the other rivers also, in New England, in Pennsylvania, on the Ohio River and its tributaries, lumber was bound into large rafts which the river current bore at small expense to the destination. Later such rafts went all the way from Wisconsin to St. Louis, and even to New Orleans. The crew in charge cooked and slept on the raft, which they guided with long sweeps. Thus large quantities of pine moved from Pennsylvania and Wisconsin to points where it served the needs of the Prairie States during and after the Civil War. The soaking in water was believed to aid the seasoning of the lumber.

Losses incident to log driving brought about the rafting of logs, which is still an established practice at certain points along the Pacific Coast, and to a less degree in Southern coastwise waters. A noteworthy example is the rafting of Douglas fir logs from Oregon to a mill in San Diego. Some of these rafts are as large as ocean steamers.

Before the Coming of Railroads, Rafting of Lumber Was a Common Sight on American Rivers and Lakes.

Engraving by Penner, Sears & Company, 1831



WATER DRIVEN MILLS

FOR nearly 200 years the chief dependence in lumber manufacture was the single saw sash-mill, with its ponderous slow-moving water wheel and a daily output not much greater than an active pair of pit-sawyers could deliver. Such a mill served the need of nearly every small village, often combined with the grist mill. Improvements were introduced from time to time. The first advance was the use of several parallel saws in the sash so that several boards were cut at the same time. This was the gang saw. As early as 1767 gangs of fourteen saws were in operation in the Mohawk Valley. Somewhat later came the mulay saw, which was simply a single vertical saw which dispensed with the heavy "sash." This change speeded the saw and raised its cut from 2,000 to 5,000 feet a day. In common practice the lumber logs were relatively short, although before 1800 there was a mill at Trenton, New Jersey, that could handle logs sixty-three feet long. Long structural timbers were commonly hewn out with adze and broadax until after the Civil War.

The gang saws and the mulays multiplied production but naturally required more power to drive them. Turbine water wheels, although invented before 1800, did not come into general use until after steam had become a successful rival of waterpower.

The circular saw which cut continuously and not intermittently like the vertical saws, was first introduced about 1820. After a long period of change and refinement, it was considered superior to the gang saws of the time. The water driven sawmill with either form of saw (but more commonly the gang), came to its peak of utility in the East before the Civil War. Forty thousand feet represented a big day's work.

The old waterpower mill here illustrated cuts 1,500 feet a day, using twelve horsepower from the seventeen foot over-shot wheel. The first mill on this site, built in 1790, had a sash saw cutting only 100 feet a day.

United States Forest Service

The Circular Saw Operated by the Water Wheel as Shown Here Began to Replace the Vertical Saw About 1820.

THE COMING OF STEAM

THE waterpower available for sawmills was limited in quantity and fixed in locality. Once the river valleys had been lumbered there remained great areas of timber which could not be lumbered because of insufficient water. Mobile power and transportation were needed for further expansion of the lumber industry. Steam power to drive the mills and to handle the transportation of logs and lumber was the answer to that need.

The first steam sawmill of record was in New Orleans in 1803. Near Pontiac, Michigan, was another in 1830. Two decades of invention and research however were to pass before steam mills became successful rivals of the best development in waterpower. In the late fifties steam mills, usually driving large circular saws, had become common in the Lake States. The best of them could cut 125,000 feet in a day. Here, after the Civil War, were developed the first of the large merchant mills designed to supply the needs of growing cities, the settlement of the Prairie States and an enlarged foreign trade. Around such mills wooden towns grew up, which were usually abandoned when the mill eventually cut all the available timber. For the mills there was no profit in forest protection beyond the time necessary to cut the timber. Consequently their progress was marked by waste and destruction.

Following 1850 the Steam Sawmill Rapidly Replaced the Water Power Mill and Speeded Up Lumbering Tremendously. View of a Primitive Steam Mill.

Photograph by John D. Cress, Seattle

The Modern Band Saw Reduces the Log to Lumber in a Fraction of the Time Required by the Old Water Driven Saws.

RIBBONS OF STEEL

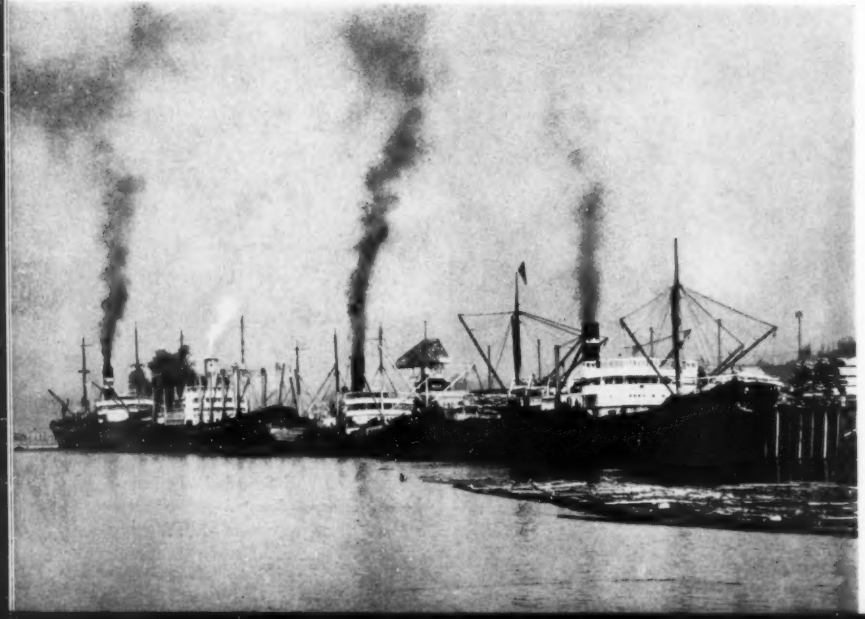
DURING the eighties and the nineties came very large, highly developed mills. White pine lumbering in the Lake States produced the big organizations and large capitalization which have been characteristic of the principal manufacturing regions ever since.

With these mills came the latest development of the saw, an endless steel ribbon, known as the band saw, which added more speed to the conversion of trees into lumber. The evolution of the various saws is a story in itself of high achievement in design and metallurgy. One form succeeded but did not eliminate another, and in modern plants gang, circular, and band saws may be found under the same roof, each adapted to its own part of the work.

When the Lake States pine began to fail in the nineties some of these organizations moved to the southern pine lands, and some to Idaho and the Pacific Northwest, where their names still tell of their origin. Twenty-five years later many large Southern organizations moved to the Pacific Coast and the Rocky Mountains.

The Modern "Lumber Barge"—Ocean Going Freighters Loading Lumber on the West Coast For Transportation Through the Panama Canal to Eastern Markets.

Courtesy Long-Bell Lumber Company



THE LUMBER BARGE

FOLLOWING the Civil War, the Great Lakes served for several decades as a means of transport for lumber, lath and shingles moving to points on the Atlantic seaboard, from New England to Georgia. Buffalo and Tonawanda were the principal receiving points for western forest products and other commodities moving east. The movement of lumber on the Lakes was a great established business, comparable to the present ocean traffic from the west coast via the Panama Canal to the Atlantic States. While the modern freighter may carry up to two million feet, some of the largest barges carried as much as 500,000 to 700,000 feet. There were also canal boats carrying 150,000 to 300,000 feet. They were towed in groups of six or eight by powerful side-wheel tow-boats, both on the Lakes and down the Hudson River. The Erie Canal diverted to New York a large amount of commerce that otherwise would have gone to other cities, and it is to that influence in a critical period that New York owes much of its commercial pre-eminence.

FROM OXEN TO HORSES

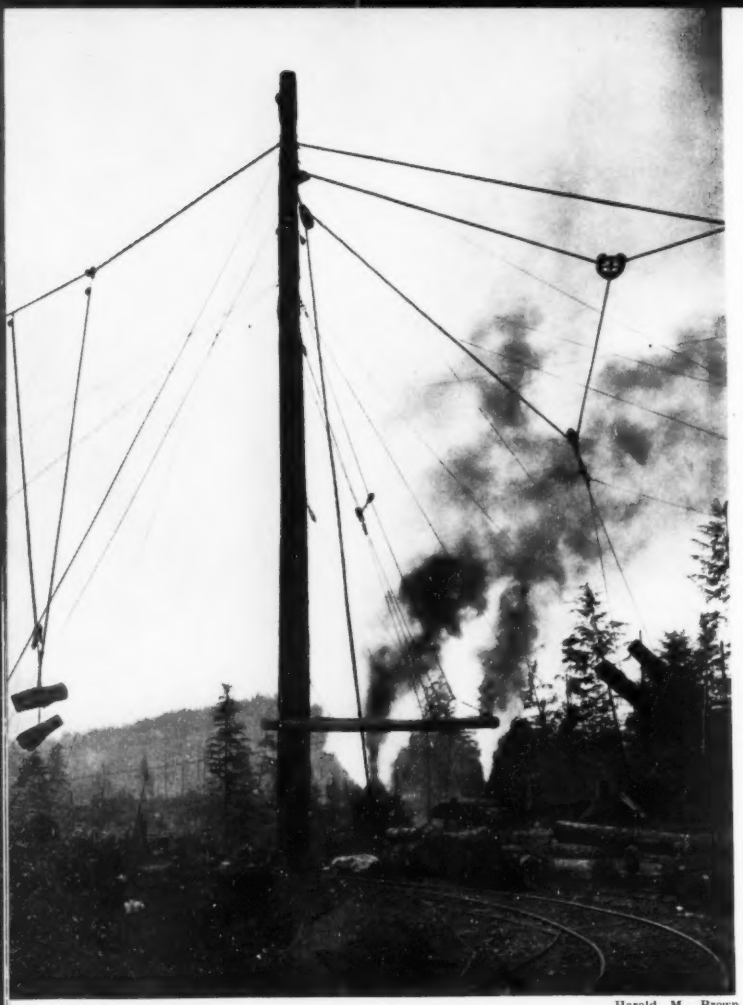
THE productive capacity of the merchant mills was far greater than had been the case in the older establishments. Such plants could no longer be supplied by the primitive logging methods of earlier years. More and more horses displaced oxen in the woods and accelerated the operations of skidding and hauling logs. A pair of horses and a "wagon-sled" enabled a man to do as much work as one had done before with a bobsled and eight oxen. American lumbering is replete with feats of horses in handling logs. In the North Woods, logs were hauled mostly in winter and snow roads were built with easy grades, on which the large sleds ran in ruts of solid ice. Over such roads the powerful logging teams could haul ten thousand feet in a single load. Loads twice as large have been recorded. "Horse flesh" during its hey-day of lumbering has probably performed more hard work in American forests and been the subject of more profanity, much of it of an affectionate nature, than in any other field of New World development.

The Horse Gradually Replaced the Ox in the Lumber Woods and Logs Moved More Swiftly to the Mills.

THE IRON HORSE

AS lumbering removed the forests farther and farther back from streams, railroad logging came into wide use. The "Iron Horse" as it was called by the lumberjack, not only moved logs in greater volume, but it was much more dependable than river driving. The first logging railroad recorded was built in Steuben County, New York, in 1852. The Lake States loggers promptly adopted rail logging in many localities. Light track, which could be moved and extended as the job required, enabled locomotives to haul train loads of logs from yarding points many miles from the mill. Such railroads often lay "up hill and down dale" across country, with little expenditure for grading. The locomotives rocked perilously, but as long as the train stayed on the track Paul Bunyan chewed his tobacco with unruffled mien. Geared locomotives of high traction power were developed principally for logging mountainous country such as the Sierras and the Cascades of the far West. Many modern common carriers now follow rights-of-way first selected by these primitive railroads.

With the Widespread Introduction of the Logging Railroad Late in the Last Century, Trees Became Lumber Almost Overnight.



Harold M. Brown

Logging Today is a Highly Developed Engineering Science. Here Is Shown the "High Lead" Method, Used in the West, of Yarding Logs by Suspended Cables.

THE HIGH LEAD

THE West has utilized all methods of logging practiced in the East wherever they were applicable, but has been forced to add some methods of its own. The enormous size of the Pacific Coast timber and the roughness of the topography required the development of special logging facilities.

Timber trestles of large size span gorges over which the logging railroads pass. Although their giant logs were rolled into streams or skidded to tidewater by animal power in earlier days, the logging of mountain lands compelled the use of greater power. Therefore the power of engines is used in skidding logs from the stump to the yard by reeling in steel cables to which they can be attached. There are numerous variations of the power yarding machinery, but the three principal methods haul the log in either along the ground, or partly suspended, or wholly suspended from an overhead or high lead cable. Logs 500 to 2,500 feet distant are skidded by such machinery. Upon arrival at the yard, engine power is again utilized to lift them on a railroad car or on a truck, unless some other sort of primary transportation is used, such as a flume, or a chute or a driving stream.

And the "Skidding Team" of Horses is Giving Way to the Gasoline Tractor That Brooks No Obstacles.

TRACTOR LOGGING

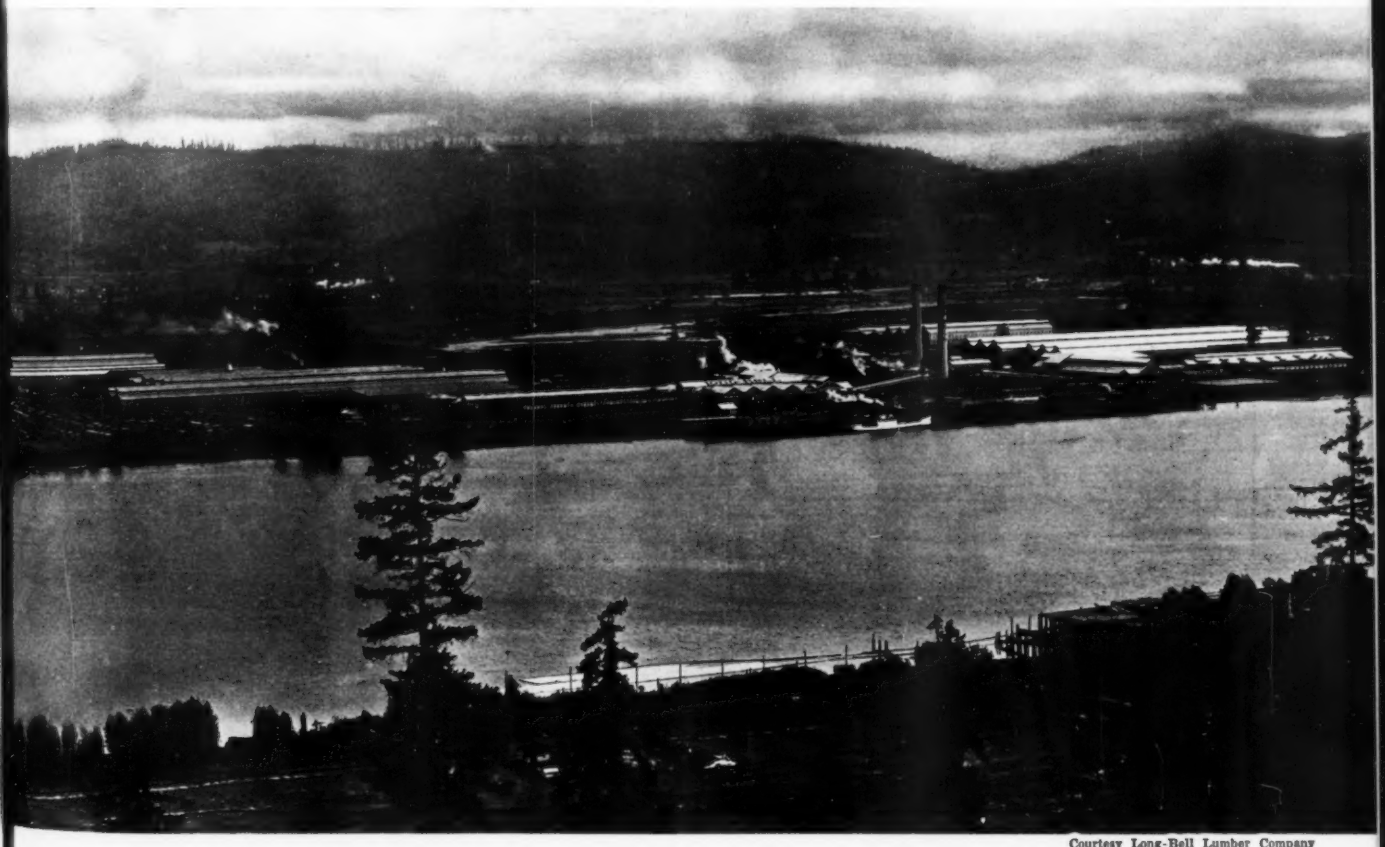
FOLLOWING the World War the use of tractors in conjunction with some form of wheeled carriage for the log has become common where the topography is favorable, as in the pine forests of eastern Oregon, and in parts of the Douglas fir region. In some instances portable power driven saws are used for felling and bucking, but the main reliance lies still in the muscles of the sturdy lumber-jack. The tractor is more and more forcing the horse, the donkey engine and the railroad from the lumber woods. It is proving not only more economical but less destructive than steam logging.

THE LUMBER GIANT

ALTHOUGH some mills of the largest size are now active in several parts of the country, it is fairly conceded that the sawmill has reached its climax on the Pacific Coast. In the three Pacific States there are nearly one hundred mills whose normal cut averages more than 80,000,000 feet a year. Some of these mills under favorable conditions could cut upward of a million feet in a single day. In such mills practically all operations are performed by mechanical power and they embrace a large assortment of machinery, including that of their planing mills, with subsidiary dry kilns and by-products plants. Electricity is in common use.

Few mills of the largest size remain in the Lake States and the number in the South is steadily diminishing. In their place have come more numerous units of smaller size. The smallest mills are too small to be efficient. The biggest mills are apparently too big to be permanent. A problem that must eventually be solved is the adjustment of efficient conversion units to the volume of a permanent timber supply.

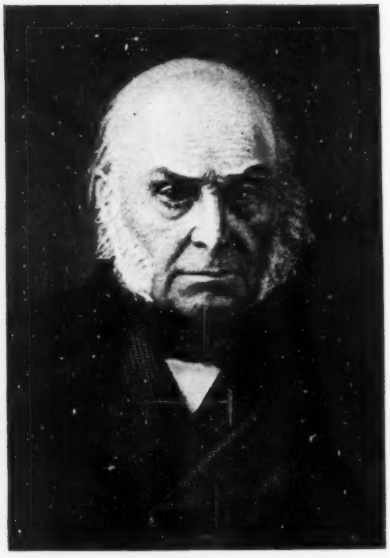
A much larger question is the effect of 300 years of destructive lumbering upon the present and future lives of our people. While the lumber industry has more than met the nation's demand for lumber, it has from the beginning followed wasteful, destructive practices in the woods that have exhausted the forests of one region after another and have left to the counties, states and nation the tremendous task of restoring millions of acres of cut-over lands to a productivity that will support rural populations and industries. Destructive methods still widely characterize the industry and continue to aggravate the long chain of social and economic problems growing out of devastated lands. Today the most urgent problem in the whole field of conservation is that of stopping destructive lumbering and instituting forest practices that permanently sustain the forest and, with it, local industries and local communities.



Courtesy Long-Bell Lumber Company

A Modern Sawmill in Washington, Equipped to Saw a Million Feet of Lumber in a Single Day—Enough For the Building of Fifty Houses.

THE DAWN OF CONSERVATION



President John Quincy Adams—Father of Santa Rosa, 1828.

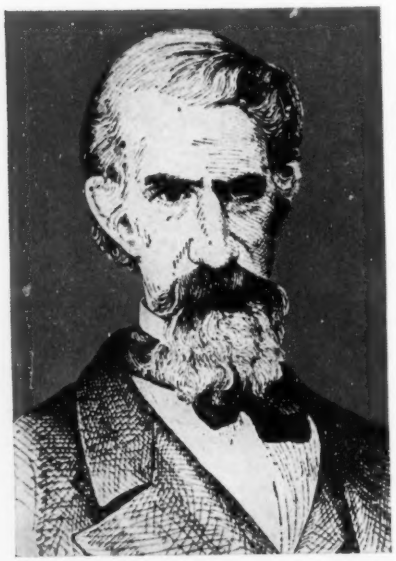
Carl Schurz—Forest-Minded Secretary of the Interior, 1877-1881.

THE THEORY OF INEXHAUSTIBILITY

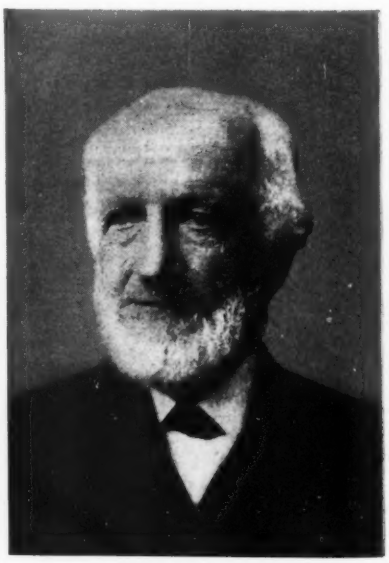
TO early Americans the need of conserving natural resources against the day of exhaustion did not exist. Their dominant concern was the conversion of natural wealth into goods and money for the maintenance of life and home and the development of the community. The most apparent resource was the forest and its extent was so vast as to create at once the belief that it was inexhaustible.

Nevertheless, colonial America did have a conservation creed of a kind. It was represented by regulations and ordinances designed to protect against waste and theft those resources needed by and accessible to settlements and towns. These measures largely grew out of the denudation of local supplies of timber. In 1670 a number of towns in Massachusetts were "much straightened for building timber" and less than one hundred years later Boston, Philadelphia and other cities were experiencing a shortage of local forests. As a result a sizeable body of colonial ordinances had taken form by the time of the Revolution. Notable among them was William Penn's famous ordinance of 1681 requiring that in the clearing of land one acre in every five should be left in trees.

These measures seem to have been purely defensive efforts of various localities to preserve the accessibility of forest supplies. Throughout the whole Colonial Period and for almost one hundred years afterwards America had no conscious policy of conservation that envisioned the use of natural resources on a self-perpetuating basis. On the contrary, settlement and development followed with a vengeance the theory of inexhaustibility.



John A. Warder — Organizer of The American Forestry Association in 1875.



Franklin B. Hough — First Forestry Representative of the United States Government, 1876.

SANTA ROSA

THE nearest approach to a national idea of conservation during the first 250 years of American life occurred in 1828, when President John Quincy Adams became concerned over the supply of live oak timber and launched a forest undertaking designed to provide for the future live oak needs of the United States Navy. Live oak was the wood par excellence for the framework of ships. Its growth was restricted to the South and the supply was limited. It had long been in great demand by ship builders both along the eastern coast and in England, with the result that oak forests had been badly depleted.

Sea power in President Adams' day meant wooden ships and he foresaw that maintenance of a strong United States Navy depended upon a permanent supply of proper timber. One of his first acts upon becoming President was to establish a naval station in the live oak region of Pensacola, Florida. At the same time he had a reconnaissance made of the live oak supply along the coasts of Georgia, Florida and North Carolina. The depleted conditions reported prompted him to initiate a project for the growing of live oak for naval timbers. To this end he withdrew thirty thousand acres on Santa Rosa Island, across the bay from the new Pensacola Naval Station, and in December, 1828, work began on this, the first Federal venture into the field of forest management.

The reservation contained areas of thickly grown young live oak, and President Adams' plan called for the thinning of these stands to increase growth, the planting of young trees where needed, and the experimental planting of live oak acorns on some two hundred acres to demonstrate the feasibility of growing live oak from seed. A caretaker was established and twenty negro slaves put to work.

The Santa Rosa project, however, was short-lived. Scarcely had President Adams been succeeded by Andrew Jackson when the latter's Secretary of the Navy, John Branch, made short work of the live oak reservation by terminating it in January, 1831. Thus ended, almost before it was well started, the American Government's first venture in forest perpetuation. President Adams, in his forest thinking, was too far ahead of the times.

President Benjamin Harrison, Who Created the First Forest Reserve in 1892.

Bernard E. Fernow, Pioneer of Forestry, 1882-1898.

THE STIR OF FORESTRY

WHEN President Adams created the ill-fated Santa Rosa Reservation, the country west of the Appalachians was still largely public lands. Timber looting was an accepted corollary of frontier building. As one decade moved to another, exploitation of forest resources, accelerated by national policies of loose land disposal, outran settlement and became a national rampage, politically condoned in the name of development. Its debauchery of forest resources swept through the Lake States, then the South and finally into the rich empire of public lands of the West.

The century was a dark page in America's handling of its natural resources but it was not without a bright side. Thinking men in increasing numbers began to challenge the Government's lack of protection of public resources. Settlement of the prairies where homebuilding encountered a treeless environment helped crystallize a national consciousness that the forests were not after all inexhaustible. In 1873 the American Association for the Advancement of Science at the instigation of Dr. Franklin B. Hough, of Lowell, Massachusetts, memorialized Congress and the states to enact legislation to protect the forests. Two years later Dr. John A. Warder called together a group of citizens in Chicago, September 10, 1875, and organized The American Forestry Association for the public promotion of forestry and timber culture. This marked the first organizing of national public sentiment in America. The following year Congress authorized the Department of Agriculture to appoint a forestry agent and Dr. Hough was selected for the position. In 1877, Carl Schurz, German immigrant, statesman and student, became Secretary of the Interior. He was an influential advocate of the scientific handling of forests in America and was among the first to propose and urge the establishment of Federal forest reservations.

THE FOREST RESERVES

IN 1882 an American Forest Congress was held in Cincinnati attended by prominent advocates of forestry from all parts of the country, out of which came a merging with The American Forestry Association and the real beginning of the Association's national activities. The Congress was notable on two accounts. First, it organized public sentiment on a larger and more influential scale than ever before. Second, it brought into the movement Dr. Bernard E. Fernow, a trained forester from Prussia, who had come to America a few years before. Dr. Fernow became the Secretary and spearhead of the Association, serving until selected, in 1886, to head the Division of Forestry in the Department of Agriculture. Under his leadership the Association began a national campaign for forestry, one objective of which was legislation by Congress to reserve timbered portions of the Public Domain and to place them under forest administration.

Many groups, organizations and prominent men were enlisted in the fight to save the remaining public timberlands of the nation. Finally in 1891 Congress passed an act giving the President authority to withdraw areas of the Public Domain as forest reserves. The following year President Harrison created the first reserve—the Yellowstone National Park Timberland Reserve—in Wyoming and before his term expired, he had set aside forest reservations totaling thirteen million acres. The Act of 1891, however, failed to provide for the protection and administration of the reserves and the forestry movement was loudly charged with "locking up" from use the forest resources of the country. Direct efforts to have Congress remedy the defect proving ineffectual, The American Forestry Association, in 1896, asked the Secretary of the Interior to invite the National Academy of Sciences to study the question and propose a policy for the administration of the public timberlands. This he did.

The Academy's recommendations, prepared by a committee of which Charles S. Sargent, eminent dendrologist of Harvard University, was chairman, and Gifford Pinchot, recently returned from forestry training in France, secretary, contributed to two notable accomplishments: The addition by President Cleveland on February 22, 1907, of 21,000,000 acres to the forest reserve system and passage by Congress of the Act of June 4, 1897, providing for the administration of the reserves and declaring their purpose to be the securing of favorable conditions of water flows and the regulated utilization of the forests.

A Group of Citizens Attending the American Forest Congress at Washington in 1905. This Meeting, Called by The American Forestry Association and Held At a Psychological Moment, Was a Deciding Influence in Effecting the Transfer of the Forest Reserves to the Department of Agriculture.

In 1908, President Theodore Roosevelt Awakened the States to the Importance of Conservation by Calling a Conference of Governors at the White House. The Conference Gave Both State and National Forestry a Tremendous Impetus.

FROM RESERVES TO NATIONAL FORESTS

THE public lands which Presidents Harrison and Cleveland had withdrawn as forest reserves were all in the West. The task of placing them under administration was large and complicated. Various western interests bitterly opposed every step on the part of the Government. Moreover, the Government was unprepared for so large a forestry undertaking. The forest reserves were placed under the Department of the Interior, which had no foresters. The Division of Forestry under Dr. Fernow was a small unit of less than a dozen men in the Department of Agriculture, with no administrative authority over the forest reserves. The result was a makeshift administration of the reserves that called forth public criticism and ridicule.

In 1898 Gifford Pinchot succeeded Dr. Fernow as head of the Division of Forestry. With great energy and rare leadership he set about enlarging the scope of the Division's activities, increasing it during the next seven years from a personnel of eleven to over eight hundred men, a large number of whom were graduates of the newly established forest schools at Biltmore, Cornell and Yale. Under him the Division became a Bureau in 1901 with authority to engage in a variety of work including the making of forest plans for private timberland owners, tree planting and forest investigations. But still the Bureau had no connection with the forest reserves.

When Theodore Roosevelt came into the presidency in 1901, he fired the whole conservation movement with a new enthusiasm. His dynamic personality and his amazing grasp of the subject made it one of the great issues of the day. In his first message to Congress he attacked the Federal paradox of having the Government's foresters separated from the Government's forests. He recommended that the reserves be placed under the Bureau of Forestry. Congress refused. Again in December, 1904, Roosevelt, in a message to Congress, recommended the change. A few weeks later there was held in Washington an American Forest Congress called by The American Forestry Association. It was the most notable gathering of leaders of science and industry ever to attend a forestry meeting. It dramatized as never before the whole question of the conservation of natural resources. One of its resolutions called upon the Congress of the United States for immediate action in unifying "all the forest work of the Government, including the national forest reserves, in the Department of Agriculture." The meeting, held at a psychological moment and reflecting an aroused sentiment of the nation, is credited with having been a deciding influence upon Congress. In any event, Congress three weeks later passed the Act of February 1, 1905, transferring the forest reserves to the jurisdiction of the Department of Agriculture. The same year the Bureau of Forestry became the Forest Service and the reserves were given the official designation of National Forests.

THE NATIONAL FORESTS

Photographs by the United States Forest Service

This is the pen with which
President Roosevelt signed
the act of Feb 1, 1905, which
created the Forest Service
Gifford Pinchot

THE STROKE OF A PEN

ON February 1, 1905, when Theodore Roosevelt, with a stroke of his pen, made effective the Act transferring the forest reserves from the Interior to the Agriculture Department, he stopped once and for all, as he said, "the obvious foolishness of continuing to separate the foresters and the forest," and he opened the way to the greatest achievement in American conservation.

Roosevelt fully realized the national significance of this Act, for he devoted much space to it in his "Autobiography." "The men," he said, "upon whom the responsibility of handling some sixty million acres of National Forest lands was thus thrown, were ready for the work, both in the office and in the field, because they had been preparing for it for more than five years. Without delay they proceeded, under the leadership of Pinchot, to apply to the new work the principles they had already formulated. One of these was to open all the resources of the National Forests to regulated use. Another was that of putting every part of the land to that use which would best serve the public."

The Act of February 1, 1905, did four things: (1) it opened the natural resources of the forests to legitimate use; (2) it placed the Federal forests under the foresters; (3) it stabilized for all time the principle of reserving for public purposes the federally-owned forest lands; and, (4) it marked the beginning of American forestry on a broad scale.

Above — Theodore Roosevelt. Middle — The Pen That Changed the Course of American Forestry. Below — President Roosevelt's Chief Forester, Gifford Pinchot.

A View in the Deschutes National Forest of Oregon Which Forms Part of the 16,000,000 Acres of Public Forests That Theodore Roosevelt Saved in 1907 Just Before Signing an Act of Congress Taking Away His Right to Create Forests in Six Western States.

ROOSEVELT ENLARGES THE FOREST

BY 1905, sixty million acres of forest land had been saved for the American people; by 1907, Roosevelt, with Pinchot's assistance, had issued proclamations increasing it to over 100 million acres, all in the Far West.

The land-grabbers and "special interests" became aroused by this spread of the National Forests; it was withdrawing from entry land and timber which they wanted. Accordingly, in 1907, a far western senator attached an amendment to the appropriation bill for the Department of Agriculture prohibiting the President from setting aside any more National Forests in the six western states of California, Oregon, Washington, Idaho, Montana and Wyoming.

But the men of the Forest Service had for four years been examining public lands and gathering data on what areas ought to be placed in public forests. They were prepared. A plan was submitted to Roosevelt to set aside as National Forests 16,000,000 acres of public lands in these six states, before he signed the Agricultural Bill with the amendment that would take away his power to create forests. The President was quick to act and signed the necessary proclamations before he approved the Department bill.

By this far-sighted act Roosevelt outgeneraled the enemies of conservation and saved 16,000,000 acres of forest land for the public. He remarked characteristically, "The opponents of the Forest Service turned handsprings in their wrath."

Protection of the Water Supply Is One of the Basic Purposes of the National Forests. Here in the Kaniksu National Forest, Idaho, Is Typified the Forest-guarded Sources of Most of the Streams that Water the West.

WATER AND THE WEST

ALTHOUGH Congress in 1891 authorized the President to set aside unreserved public lands for forest reserves, it was the Act of June 4, 1897, that clearly defined the purposes of the reservations. These were "to improve and protect the forest within the reservation, or for the purpose of securing favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of citizens of the United States."

The water supply of the western states comes largely from streams and rivers that have their rise in the Rocky, Cascade and Sierra Nevada Mountains. The idea of forest reservations to protect these water sources gained strong western support despite the protests of the "free booters" of the Public Domain. The question of water is today so acute in the West that no clear-thinking person would consider the suggestion that the National Forests be returned to the Public Domain for quick disposal to private interests. Over 750 towns and cities, mostly in the West, now depend on the National Forests for their water supply. Over eighty-five per cent of the water used to irrigate the West has its origin in mountain streams whose headwaters are protected by National Forests. Forty-two per cent of the waterpower resources of the eleven western states or over thirty-five per cent of the waterpower resource of the entire country is actually within the National Forests, and these represent the greatest system of protected watersheds in the world.

All Cutting of Timber in the National Forests Is Done Under a Plan of Preserving Continuous Forest Growth. The Picture Shows One of the Early Cuttings in the Black Hills National Forest, South Dakota.

FORESTRY BEGINS

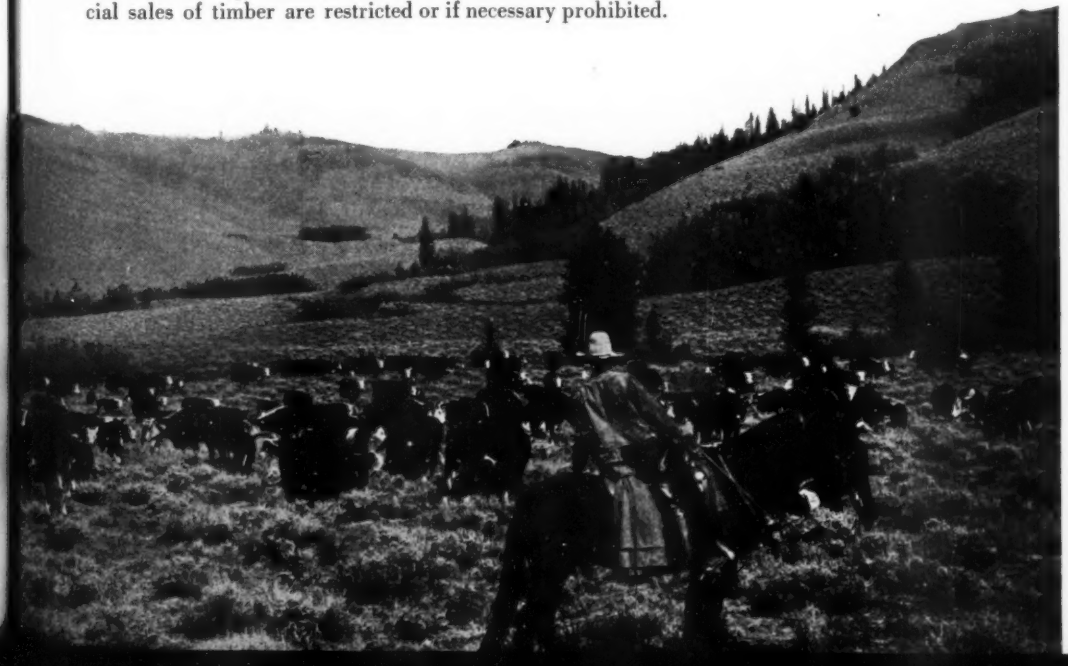
THE Act of 1897 made provision for sale of mature timber from the forest reservations, but the actual practice of forestry did not begin until 1905, when the reserves were transferred to the foresters of the Department of Agriculture for administration and development. From that date the harvesting of mature timber for the improvement of the forests and for the use of the people of the United States has been a continuous policy. Sales have totalled over thirty-seven billion feet and have yielded the Government an income of $54,065,000.

Timber sold from the National Forests is first examined, cruised, mapped and advertised for bids, a minimum stumpage price being set. Before cutting begins by the purchaser, a detailed contract is entered into which specifies the kinds of trees to be cut, the marking, height of stumps, utilization requirements, disposal of brush and tops, scaling by forest officers, and stumpage rates. In large sales covering a period of years, provision is made for readjustment of stumpage rates. Forest officers blaze or mark every tree to be cut according to scientific principles and scale or measure all logs and wood before removal from the forest. Forest management plans have been prepared for practically all forests, based on the principle of sustained yield, or the cutting of an amount equal to the growth. Thus over-cutting of the forest is guarded against. On areas the highest public service of which is water protection, recreation or other use, commercial sales of timber are restricted or if necessary prohibited.

DEVELOPING THE FOREST RANGES

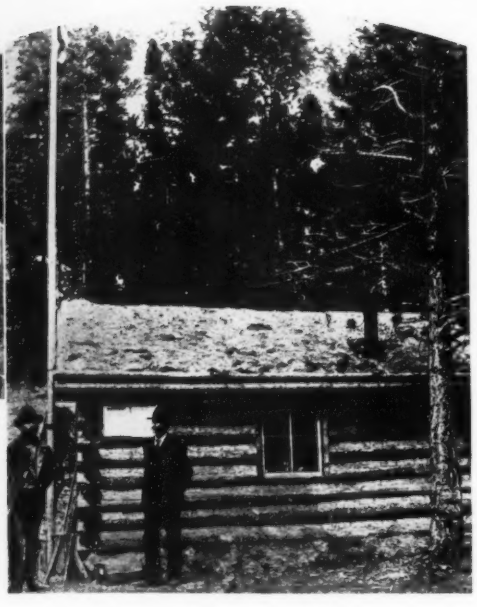
EARLY in the history of livestock in the West, cattle and then sheep began to be grazed on the mountain ranges during the summer. This custom was well established before the first forest reserve. The Public Domain was open and free to grazing and the numbers of livestock increased. Conflicts over choice forage became common; range wars followed, with loss of human life and livestock, especially sheep, for the cowmen bitterly resented the coming of the "woolies." Soon the range became overstocked and overgrazed and deterioration set in.

Into this picture rode the early forest ranger. By standing firmly on the ground that all who grazed stock on National Forest ranges must secure permits and pay for the privilege; by studying range conditions on the ground; by the use of good judgment, and by cooperation with the stockmen, the men of the Forest Service finally brought about orderly range use in place of the range wars and destructive overgrazing of early days. The carrying capacity of the forest grazing areas is now greater than in 1905. In that year, there were 692,124 cattle and horses and 1,709,987 sheep and goats under permit. Despite the fact that heavy reductions have been necessary in some cases to relieve overgrazed and depleted range and to provide for game animals, over 7,000,000 sheep and cattle are today provided summer range in the National Forests.



Into the Western Picture Rode the Forest Ranger, Who Ended Range Wars and Brought About the Orderly Use of National Forest Ranges.

Copyright by Charles J. Belden



Above—A Modern Ranger Station, Gallatin National Forest, Montana. Right—The First Ranger Station, Built in 1899 on the Bitterroot National Forest, Montana.

THE FOREST RANGER

THE early day forest ranger was a real pioneer,—a rough and ready man untrained in forestry who was supposed to know the West and the ways of the West. His government pay was sixty dollars a month, and he was lucky to have six months' employment during the year. A yellow pine stump on which he kept his diary forms, a bottle of ink, a pen and some envelopes, all covered by a canvas, weighted down by rocks, usually served as his "official station." He furnished his own tent, for there were no ranger cabins or stations, unless he built himself one. His main duties were to ride through the forest and watch out for fires and timber trespassers.

In 1905 came Civil Service and the first step in the selection and training of men for the great diversity of duties involved in efficient administration of the forests. Today the permanent ranger force of the National Forests numbers over eight hundred men,—not only trained in the school of experience, but many of them graduates of forest schools. They are furnished ranger stations and necessary equipment and supplies for the performance of their work, which calls for a broad knowledge of practical and scientific technique in many lines of forest activity. In contrast to the early theory that a ranger should be stationed as far back in the forest as possible, present day ranger stations are located at points of easy access to the forest-using public. Each National Forest is in charge of a forest supervisor and the rangers work under his direction.

MEETING THE FIRE MENACE

FIGHTING a forest fire is and always has been the ranger's hardest work. It was ten times harder in the early days than now because the ranger had little help and few tools. Roads and trails were few, and there were no telephone lines. In time, Congress yearly provided funds for telephone lines, lookouts, tools and tool caches. Periodically the "bad" fire years came, and the rangers had their baptisms of fire—1902, 1910, 1919, 1929. But out of the bad years came valuable experience which, combined with constant thought and study and with increased funds for the development of trail, road and communication systems and of modern fire-fighting equipment, has enabled the Forest Service to provide the National Forests with probably the best forest protection system in the world.

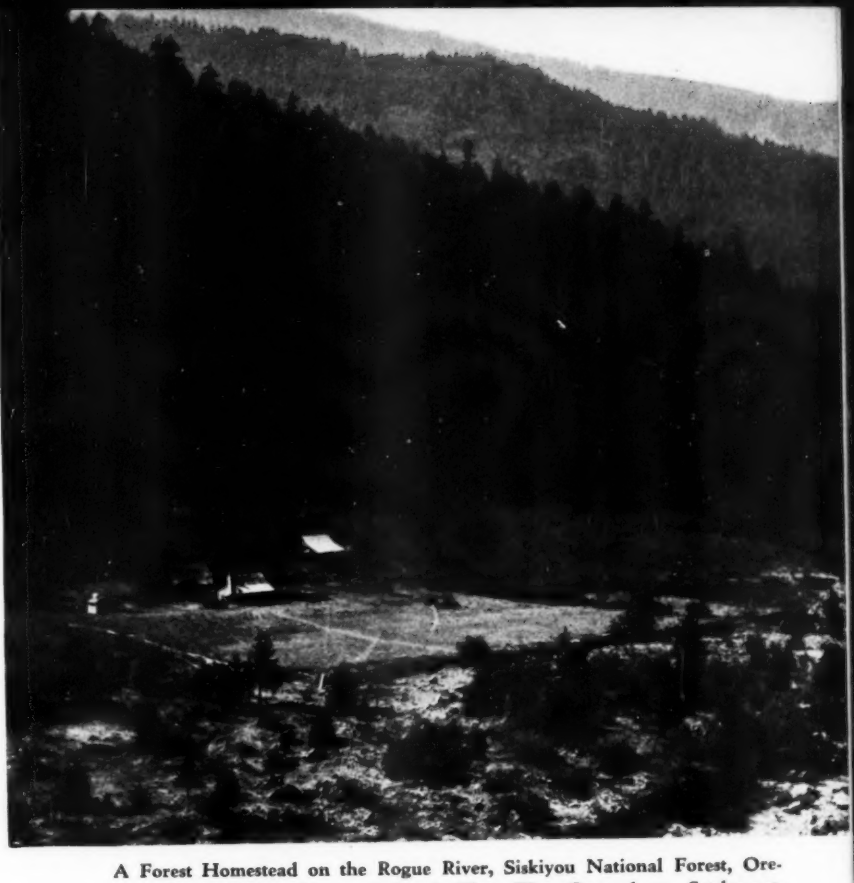
With the enormously increased use of the National Forests during the past twenty years, the number of fires occurring each year has increased greatly but the area burned and the damage done have been gradually reduced. During seasons of great fire danger, stringent rules in respect to smoking and the building of camp fires are enforced. Carelessness in the use of fire in the forests is vigorously prosecuted.

Modern Methods, Machinery and Technique Today Protect the National Forest Against Forest Fires. Here Tractors are Rapidly Constructing Fire Lines.

FOREST HOMESTEADS

IN setting aside public lands for National Forests, inevitably there were included areas of river bench land and mountain meadows that held possibilities for agriculture. Prior to 1906, however, there was no law by which such areas could be legally located, since the proclamations creating the forests withdrew all lands from homestead entry. To meet this situation, Congress passed the Act of June 11, 1906, which permitted the homesteading of lands within the Forests, which examinations showed to be more suitable for farming than for forest purposes.

Many people looked on the law as a means to acquire valuable timberland, but the Forest Service refused to list any lands not giving reasonable assurance of supporting a home. Over 20,000 separate tracts containing some two and one-fourth million acres were examined and opened to entry. They were located in every National Forest from Florida to Alaska. Hundreds of areas were listed but never filed on, thus refuting the charge that the National Forests were retarding the development of the West.



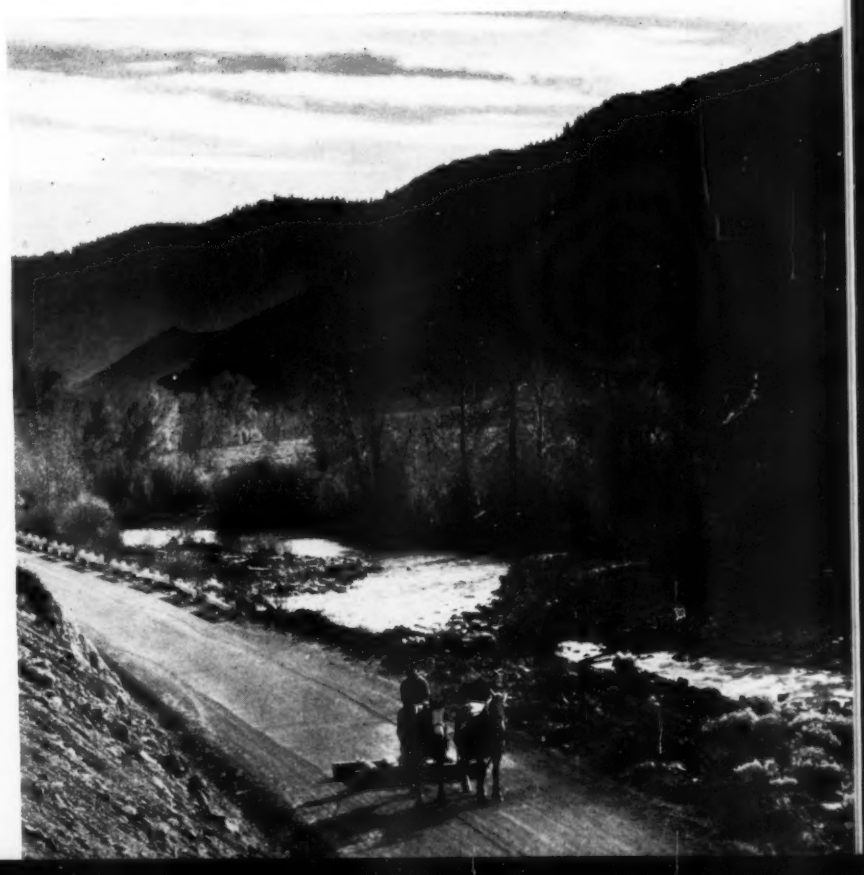
A Forest Homestead on the Rogue River, Siskiyou National Forest, Oregon, Exemplifying Type of Land That Was Opened to Settlement.

PUTTING THE FORESTS TO USE

IN the early days of the forest reserves, Congress provided only meager funds for administration and practically none for the development and protection of forest resources. The timber, forage, water, scenery, recreation, and wildlife of the National Forests could not be put to legitimate and regulated use because these resources were largely inaccessible. Furthermore, these priceless public properties were being destroyed by fire because of the lack of equipment and an adequate ranger force.

Gradually, as Congress realized the public need for protection and development, annual appropriations contained items for these purposes. A system of roads, trails, telephone lines and ranger stations has been constructed; unused stock ranges made accessible, watering places developed, bridges built, forest research stations established and public camp grounds and summer home sites developed. Thus the National Forests, embracing over 162,000,000 acres, are in point of area the greatest forest property in this or any other country where the principle of conservation and multiple use of resources for the public welfare is being worked out.

Roads Have Made the Forest Available for Many Uses. Below Is a Road in the Sawtooth National Forest, Idaho, Heavily Used by Recreationists.



A Planting Crew on a Western National Forest Reforesting Some of the 2,000,000 Acres Which in Years Passed Have Been Burned.

FOREST RECREATION

THE National Forests with their millions of acres of forested and mountainous country form the greatest potential resource of public recreation in the United States. Fishing, hunting, camping, hiking, canoeing, nature study and similar outdoor sports are all to be found in varying degrees of ruggedness. Recreational resources were little recognized or considered in early forest administration. It was not until the advent of the automobile that recreation began to loom as one of the great public uses of the National Forests.

During the decade 1920-1930, there was an amazing influx of visitors and pleasure seekers, and from them came demands for more and better forest roads and trails, places to camp, spots on which to build little summer cabins. Although Congress had provided no money for adequate development of recreational resources, the Forest Service attempted to meet the ever growing need for improved camp grounds and proper sanitation in order to avoid outbreaks of disease and to reduce the fire hazards incident to the presence of millions of people building camp fires in places beyond ready observation.

The growth of this use of the forests is shown by the fact that the number of visitors has increased from 5,000,000 in 1920 to over 38,000,000 in 1934. The present policy of the Forest Service recognizes that certain sections of the forests will serve their highest public use as recreational areas and are to be protected against economic exploitation. The forests are open to the public for recreation without charge and while camp grounds and other like conveniences are being multiplied and bettered as funds become available, improvements are purposely kept simple and rustic.

PLANTING THE BARREN LAND

FOREST planting was one of the first forestry activities in the National Forests following 1905. There were millions of acres of old burns on which it was thought a forest cover could be established only by artificial planting. Later it was found that many of these acres would reforest naturally and the policy was adopted of planting only areas where it seemed certain nature would not do the work, Even so, the lands in need of artificial planting both for timber production and watershed protection amount to several millions of acres. In recent years, the Forest Service has adopted a twenty-year planting program estimated to cost $21,000,000 but with lands currently added to the forests in the eastern United States the program is being expanded.

Reforesting the burned areas in the National Forests is an expensive undertaking, costing from $3 to $25 an acre. It calls for the organization of seed collecting crews, the construction of seed extraction plants and forest nurseries and the assembling of planting crews during the proper seasons of the year. It also calls for a large amount of technical knowledge of the best species to plant, nursery stock, and protection of the seedlings.

Since 1905, the Forest Service has planted over 400,000 acres in the National Forests. Its nineteen nurseries scattered throughout the United States have a present estimated capacity of 180,750,000 tree seedlings; under present plans this capacity will be increased to some 300,000,000 young trees.

Millions of People Are Today Using the National Forests for Camping and Other Forms of Forest Recreation. Below—A Camp-ground in the George Washington National Forest, Virginia.

(1) Eastern White-Tail Deer (2) Lynx (3) Mountain Sheep (4) Mountain Goat (5) Black Bear and Cub (6) Antelope

GAME AND WILDLIFE

THE undeveloped lands within the National Forests before the coming of the white man were the natural haunts and refuges of both wild animals and certain species of birds. The main watercourses of the United States head largely within the mountains and these rivers and streams were always the natural spawning grounds for trout and salmon.

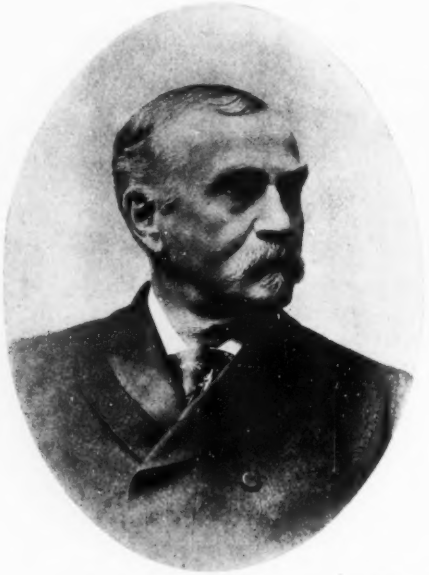
With the settlement of the West, wildlife was forced back into the more inaccessible mountain regions where summer environment was favorable but where rigorous winters forced them back to lower elevations for winter feed. In portions of the West the shortage of winter feeding grounds is determining the big game population of some National Forests. Fully sixty per cent of the big-game winter ranges lie outside forest boundaries. Many National Forests have practically no winter range for big game. While the grazing of large numbers of domestic sheep and cattle on the National Forests has been criticized as detrimental to wildlife, thirty-eight per cent of the Forest is used by neither sheep nor cattle, and most of this is fine game country. Moreover, over 25,000,000 acres are in State and Federal game refuges. Under forest regulation and protection big game has increased in the National Forests. Since 1921—when the first fairly trustworthy data were available—estimates show that the number of antelope has increased 504 per cent, black and brown bear twenty-six per cent, deer 107 per cent, elk 119 per cent, moose 121 per cent, and mountain goats 102 per cent. Grizzly bear on the other hand show a decrease of seven per cent and mountain sheep twelve per cent. Game management plans for each National Forest have recently been undertaken by the Forest Service.

THE GROWTH OF STATE FORESTRY

EARLY INTEREST IN TREE PLANTING

SOON after the close of the Revolutionary War, societies to improve agriculture began to be formed, some of which interested themselves in forestry. Thus the New York Society for the Promotion of Agriculture, Arts, and Manufactures in 1791 made an inquiry as to whether "in parts of the country where wood grows scarce," tree planting might prove profitable and advisable. In 1804 the Massachusetts State Society for Promoting Agriculture offered premiums to the persons producing from seed the best growth of specified kinds of trees. After the Prairie States were settled the agricultural and horticultural societies in that region gave much attention to tree planting. Among them was the Minnesota State Horticultural Society; and the interest led, in 1876, to the organization of the Minnesota State Forestry Association—the first State forestry association in the country. It was estimated that between seven million and ten million trees were planted in Minnesota in 1877. State funds were appropriated to aid the Association.

The agricultural and horticultural societies were the precursors of State agricultural departments. At the same time, they had much to do with developing the interest in "timber culture" or forestation, which chiefly made up the forestry movement in the United States to near the close of the nineteenth century.



J. Sterling Morton, Founder of Arbor Day and President of the American Forestry Association, 1893-1896.

ARBOR DAY

J. STERLING MORTON, Nebraska pioneer, farmer, journalist, public-spirited citizen, territorial official and influential political figure, reached the acme of his career when President Cleveland made him Secretary of Agriculture, for the period 1893-97; but he regarded as the crowning achievement of his life the institution and success of Arbor Day. Like other migrants from the wooded East to the prairie country, he felt deeply the need to transform it through extensive tree planting. Trees were desired not only for comfort and the adornment of a monotonous landscape but also for climatic reasons. It was commonly believed that conquest of the Great American Desert for agricultural occupation depended on getting it largely forested. Today the traveler across most of the originally treeless prairies sees a landscape more like parts of New England and New York than like the great open spaces of the covered wagon days.

Arbor Day was instituted in Nebraska, in 1872, as a day for planting trees, both for shade and for wood. As the years passed its observance was enjoined by law in a multitude of other States. Premiums, bounties, and tax exemptions were further means used by the States to stimulate tree planting.

Reproduction of a Painting of the First "Arbor Lodge" in Nebraska, Where Mr. Morton Settled in 1854.

Created in 1885 for Timber Production, the Adirondack Preserve in New York Was the First State Forest. In 1894, However, It Was Closed to Timber Cutting and Has Since Been Administered as a Park.

THE BEGINNING OF STATE FORESTRY

NEW YORK was the first State to undertake public forest administration. The law creating the State "forest preserve" and inaugurating what is now its Department of Conservation was passed in 1885. The "preserve" was made up of lands in the Adirondacks and Catskills that had come to the State through tax forfeiture.

Soon the State began to buy land to consolidate and extend these two parks. It now owns about 2,350,000 acres. Originally designed for timber production along with water resource protection and recreational use, the "forest preserve" was, in response to public demand, completely closed to timber cutting in 1894 by the State constitution. Today the Adirondack Park, with a gross area of more than four and one-half million acres, is the largest area of its kind in the United States, far outranking even the Yellowstone National Park in this respect. However, less than half the land within the Park is in State ownership. Adirondack Park provides the most highly developed and heavily used mountain public playground and scenic and health resort in the country.

The State of New York has supplemented its beautiful recreational areas in its two chief mountain regions by a system of smaller and more local State Parks; and has also set up another acquisition policy under the so-called reforestation program, entered upon in 1929. This is building up a series of State Forests for timber production in localities where a large percentage of the land in farms has proved too poor for permanent agriculture.

In addition to New York, the States of California, Colorado, and Ohio created forestry departments in 1885. Before that year State activities in forestry had been limited to temporary commissions of inquiry to determine if State forest policies were needed, and to laws aimed at promoting tree planting by private landowners. The pioneer attempts of these three States failed, their forestry departments lasting only a few years.

STATE SYSTEMS OF FOREST PROTECTION

PROVISION for the control of forest fires began long before State forestry departments were thought of. Even in colonial times there were laws authorizing citizens to summon their neighbors for service in controlling dangerous forest fires. Later, State laws assigned the duty of fire warden to certain officers, such as town supervisors, justices of the peace, and highway commissioners. But until some central agency was set up to which these local officers were accountable, little was accomplished.

Both the Colorado and the New York laws of 1885 introduced the principle of a centralized supervision and direction of the local warden force. The Colorado law came to nothing, but the present excellent New York protective system has been attained through a steady evolution from the start made fifty years ago. In a majority of the States the need for a protective organization to control forest fires has been the primary reason for creating State forestry departments.

In the Lake States, where great and enormously destructive forest fires have periodically raged, chief fire wardens with State-wide authority were set up by law near the turn of the century. In the far Northwestern States protective systems have developed out of voluntary associations of timberland owners for their mutual protection. As State forestry departments were created in many of the older Eastern States in the last years of the nineteenth and first decade of the twentieth century, as trained technical foresters became available to take them in charge, and as the United States Forest Service developed the art of fire control on the National Forests, the primitive, ill-organized, catch-as-catch-can methods of the early warden days passed over into the beginnings of modern, highly developed protective systems.

Pennsylvania Followed Closely Upon New York in Developing Organized Forest Protection.

Above — Packing Water with Which to Fight Fire in Penn's Woods in 1903.

Left—Pennsylvania's Historic "Fire Wagon" Used During the Same Period.

Dr. J. T. Rothrock, Father and Founder of Pennsylvania State Forestry.

PENN'S WOODS

PENNSYLVANIA shares with New York the front rank in the development of State forestry administration. It was ten years later than New York in inaugurating its permanent forestry work, but from the start it planned both along sound lines and on a large scale, has had a succession of devoted and able administrators in charge, and has given the work liberal and whole-hearted support. Unlike New York, it has built upon the principle of multiple use as the keystone of its forest policy instead of making recreational use, scenic protection, and wilderness preservation objectives so dominating as largely to preclude timber harvesting. Of all the States, Pennsylvania has achieved most in putting into effect actual forest management and reclaiming to economic productiveness, through State acquisition, depleted forest and idle cut-over land, much of it formerly known as the Pennsylvania desert.

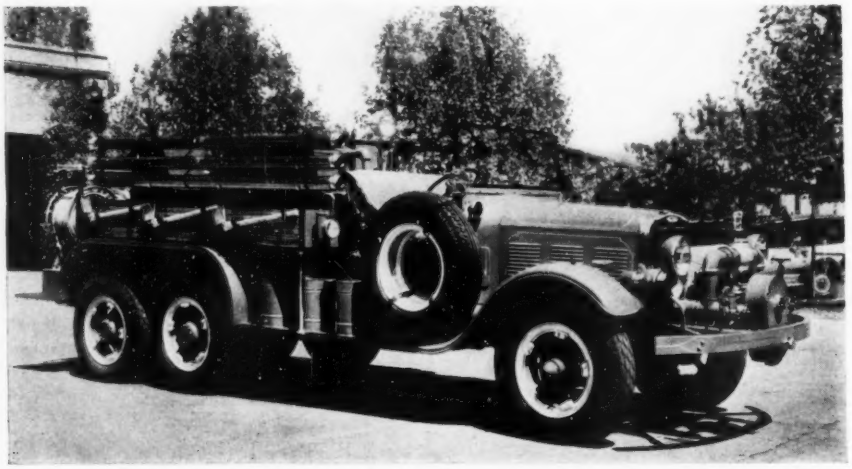
Dr. J. T. Rothrock practically gave his life to the work and is justly revered throughout the State as the founder and father of Pennsylvania forestry. For many years before the forest policy was inaugurated he was a tireless missionary traveling all over the State in its behalf. In 1895 he was appointed to the newly created position of Commissioner of Forestry, and in 1897 the State Acquisition policy was inaugurated. Six years later more than 500,000 acres had been acquired. The area now exceeds 1,600,000 acres. Pennsylvania trains its own foresters in a State technical school.

RECREATION

EARLY advocates of State Forests anticipated the growing demand for forest recreation. From the beginning recreation was recognized as a major objective in their administration. Consequently, State Forests are now contributing greatly to this need of the people.

The extent to which this use has developed is exemplified in Pennsylvania. More than fifty-five public camps are scattered through the State Forests. In a woodland environment tourists, campers and picnickers may rest and play amid rough but comfortable forest conveniences, such as shelters, fireplaces and nature trails. Permanent summer homes and hunting cabins may be erected. People may swim, ride or play golf in the State Forests located in thirty-six of Pennsylvania's sixty-seven counties.

In Such State Forest Camps as This One in Pennsylvania, Thousands May Enjoy Recreation Away from Crowded City Centers.



The States No Less Than the Federal Government Have Modernized Their Fire Fighting Equipment. Above—One of California's Modern Fire Trucks.

THE SPUR OF THE WEEKS ACT

A TURNING point in State forestry was reached in 1911, when the Weeks law was passed, introducing the principle of Federal cooperation and financial aid. At that time twenty-five States had forestry organizations of some kind, but their functions were principally to give advice to private owners, gather information, and educate public sentiment. Financial support was feeble, and progress uphill and slow. State forestry had not found itself, save in New York and Pennsylvania.

The Weeks law appropriated $200,000 to enable the Secretary of Agriculture to enter into cooperative agreements with States for the protection from fire of forested watersheds of navigable streams. Not less than half the cost was to be met by the States, which were required to organize and maintain their protective systems subject to Federal approval. This gave State forestry departments a definite and important task and field of development. The first year (1911) eleven States cooperated. By 1934 thirty-nine States were providing cooperative protection to 237 million acres.

The Clarke-McNary law, passed in 1925, broadened the scope of Federal aid in fire protection and also authorized Federal cooperation with the States in the production and distribution of planting stock for farm forestry and in extending to farmers, through the Agricultural Extension Service, knowledge of sound forestry practices. By 1935 forty-two States and also Hawaii and Puerto Rico were cooperating in one or both of these activities, and the production of nursery planting stock in State nurseries will total not far from 120 million trees for reforestation both on private and on State lands.

THE SOUTH AWAKENS

OF all the great forest regions of the country, the south was the slowest to take up forestry as a State function. In 1920 only four southern States had forestry departments. Today all have them, and nearly all have technically trained State foresters in charge. The chief activity is fire control, with Federal and private cooperation playing a large part in supporting the State protective organizations; but the all-around educational value of the departments in crystallizing public sentiment for forestry is of first importance.

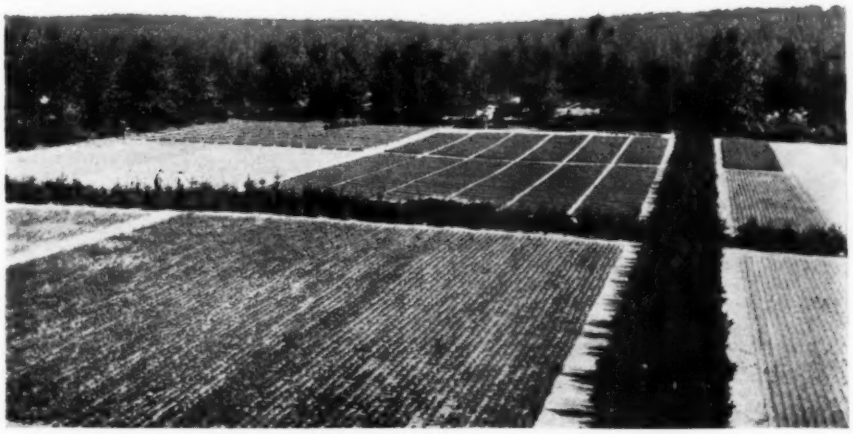
The late start of the South in forestry work was due to a combination of reasons. The States were financially cramped; the political traditions and economic attitudes of their people were almost pioneer in their disinclination for centralized governmental control; their virgin forest resources were still relatively abundant; the harmfulness of forest fires in the open-growing southern pine stands was little realized. That in the face of these obstacles forestry has gained such headway in the last fifteen years is little short of phenomenal.

Slow to Take Up Forestry, the South in Recent Years Has Made Great Progress. Here a Tractor Is Constructing Fire Lines in the Modern Way.

REFORESTATION

THE field of State forestry activity is as diversified as that of the Federal Government although not as extensive. The State deals with forest questions of local or State importance while the Federal Government deals with those of interstate or national concern. Forty-two States are engaged in forestry work to a greater or lesser extent and in most of them, the activities, outside of fire prevention, include reforestation, forest education, management of State Forests, services to owners of woodlands and forest research.

Ranking next to the protection of forests from fire is the service of the States in promoting the planting of trees by their citizens. Over thirty-five States are either operating State Forest nurseries or having planting stock grown for them for distribution to citizens at nominal cost or for the restocking of State-owned lands. Prior to the depression these States were producing over 75,000,000 trees for planting. Following 1933, when Federal emergency funds became available, State growing and planting of forest trees, mainly for erosion control, received a great impetus.



A Forest Tree Nursery in Michigan. State Nurseries Are Growing Almost 100,000,000 Trees for Reforestation.

STATE FORESTS

OUTSIDE of New York and Pennsylvania, progress in the creation of State Forests has been slow. State-owned forest land under actual permanent administration either as Forests or as Parks aggregated in 1935 about seven million acres, largely concentrated in a few States, with nearly four and one-half million acres in the North and Middle Atlantic States, two million in the Lake States, and the greater part of the remainder in the Far West. In addition, the States own some ten million acres of forest land that is not under a permanent form of administration.

State Forests under permanent administration should be greatly increased. Many millions of acres have been abandoned to public ownership via tax forfeiture after removal of the timber and in many cases these lands form the nucleus for the building of State Forests.

State Forests Help Promote Local Industries and Employment. Scene in a Maryland State Forest, Where Logs Are Being Cut for Trucking to a Nearby Sawmill.

Before State forestry can come fully into its own, its part in public forest administration must be vastly extended. In August 1935, Congress passed a law extending Federal aid to the States in the acquirement of State Forests. Under the Act, the Government may buy land suitable for State Forests and turn them over to the States for administration and development. The Government is to be reimbursed for the cost of the land from revenues derived from forest operations. This law is likely to prove even more epochal than the Weeks Law of 1911, which opened the way to the major development of State forestry up to the present time by authorizing Federal aid for organized State protection against forest fires.

THE WAR AGAINST FOREST FIRES

From Colonial Days, Fire in the Woods Has Been the Nation's Forest Enemy Number One

FIRE--EVERYONE'S ENEMY

THE damage caused by forest fires cannot be expressed in dollars and cents. Timber and other property destroyed each year is estimated at from $60,000,000 to $75,000,000, but that is only one phase of a far greater toll which fire takes from the resources and pockets of the American people. By destroying the trees and vegetation on slopes and hillsides, it starts floods and soil erosion which cause widespread human distress and cost hundreds of millions of dollars to control; it contributes to the irregular flow and drying up of streams thereby obstructing navigation and increasing the cost of water to towns and cities; it saps the fertility of the soil over which it travels; it destroys wildlife and the cover it needs for propagation; it destroys the beauty of the American landscape and robs the people of the esthetic and spiritual values of nature; it disrupts and limits the free use of the outdoors for recreation and every year endangers the lives of thousands of people in the wooded sections.

It is estimated that over 150,000 fires occur in the United States every year—50,000 in regions where there is some organized protection and over 100,000 in regions without organized protection. In the face of this widespread menace, the nation and states must maintain a fire-fighting army. Over ninety per cent of the country's forest fires are man caused. Smokers lead the list of offenders, followed by campers, brush burners, railroads and lumbering operations. From all standpoints the economical way of stopping forest fires is never to let them start. This means vigilant care with matches, camp fires and all other forms of fire in the woods on the part of every person in the United States.

Thousands of Forest Fires Every Year Are Undermining the Nation's Resources. The Most Economical Way to Stop Them Is to Prevent Them from Starting.

In the Early Days of Fire Fighting, When Sprinkling Cans and Water Buckets Formed Part of the Primitive Equipment.

THE ERA OF NATIONAL COMPLACENCY

FOREST conservation begins with protection of the forest from fires. Early recognition of that fact led after fifty years of educational crusading to the highly organized system of forest protection now in effect throughout most of the United States. It led also to the creation of a romantic and colorful figure in American life —the forest ranger.

Before the day of the forest ranger, however, the forests of the country had been subjected to almost three hundred years of uncontrolled fires. That the early settlers realized the menace of forest conflagrations is shown by numerous colonial laws and ordinances imposing penalties for the wilful and negligent starting of forest fires. These attempts, however, were haphazard and unorganized and failed to bring about any semblance of control of fires in the forest. If a conflagration did not directly threaten the community, little or nothing was done about it and the fires were allowed to burn themselves out.

This attitude of helpless complacency characterized the American people during the seventeenth, eighteenth and most of the nineteenth centuries. As a result forest fires almost from the beginning of settlement have been the greatest single agency in the useless destruction of the forest resources of the nation. Even today they are the nation's forest enemy number one.

THE FIRST FIRE WARDENS

DURING the last half of the nineteenth century, the American public began to be alarmed over the growing destruction caused by forest fires. The early leaders of conservation gradually drove home the fact that fires were not only destroying the forest wealth of the states and the nation, but were creating on a large scale conditions favorable to soil erosion, floods and the drying up of water courses.

In 1885, New York pioneered the way towards organized state-wide handling of forest fires. In that year it passed a law setting up a forest fire warden service under State direction and supervision. The beginning of organized Federal protection followed during the 90's with the appointment of a forest ranger force to protect the newly created forest preserves in the West. The examples of New York and the Federal Government spurred other states to action. By 1910 a dozen or more states had established fire warden systems of one form or another.

During this twenty-five year period, however, the science of fire fighting remained undeveloped. The newly created State, Federal and private agencies were unrelated, poorly equipped and meagerly financed. But they marked an historic advance in conservation, namely, public recognition of the need of organized agencies of government to deal with the forest fire menace.

The 1910 Conflagrations in Idaho and Montana Shocked the Whole Nation by Their Destruction of Timber.

THE NATION ORGANIZES

THE forest fires of 1910, particularly those in Idaho and Montana where more than one hundred lives were lost and millions of feet of timber were destroyed, shook the American people as no preceding fire year had done. It unquestionably hastened the coming of a new era in public handling of forest fires. Congress, recognizing the importance of forests in protecting and regulating the rivers that water the nation, passed in 1911 the Weeks Act, one section of which provided Federal aid to the States and forest owners in maintaining forest protective organizations. The law immediately encouraged the establishment of state forestry departments under trained men charged with the responsibility of forest protection. It likewise encouraged forest owners to form fire-fighting organizations to cooperate with State and Federal forces. There soon was in process of formation a national network of Federal, State and private agencies that has since become the greatest forest protective army in the world. It extends into every forested state in the union and provides protection in some degree to sixty-five per cent of the 600,000,000 acres of land in the United States subject to the hazard of forest fires. In the annual struggle to prevent and control fires it expends over $10,000,000 a year and during the fire season employs upwards of 20,000 men. Its far-flung structure of fire towers, lookout houses, telephone lines, firebreaks, forest roads and trails represents an investment exceeding $125,000,000.

THE EYES OF THE FOREST

GREAT advancement has been made by Federal, State and private agencies in developing methods and technique of forest fire warfare. Leadership in this field was taken by the United States Forest Service in 1905 when the National Forests of the West were transferred to its custody. Quick discovery of a fire in the woods after it starts, accuracy in determining its location, proper organization of fire fighters to combat it, availability of necessary fire fighting equipment and speed in reaching the fire in the shortest time possible were soon recognized as cardinal principles of organized forest protection. During the past thirty years these principles have guided the modernization of the country's fire-fighting forces.

Early experience soon proved that successful suppression called for a system of detecting fires before they gained much headway and became uncontrollable. Lookout stations strategically located, usually at the highest elevations in a given territory, were established where an observer or lookout man could constantly watch for and report fires during periods of fire danger. Many of these early lookout stations consisted of only a platform built in the top of a tall tree or of a pile of rocks on a mountain top. As funds became available, the Federal, State and private agencies constructed hundreds of modern lookout stations in the forest regions of the country.

The Pioneer Lookout Had to Depend on the Top of a Tree or High Mountain from Which to Watch for Fires.

THE MODERN LOOKOUT

TODAY the lookout man maintains his vigilant watch for fires from a modern lookout station or tower, well equipped and strongly built to withstand heavy winds, and often protected against lightning.

Many stations combine comfortable living quarters where the observer sleeps and cooks his meals and an observatory with walls largely of glass upon which he has a clear vision over a wide scope of country.

The observer is supplied with modern equipment, including telephone, binoculars, alidades or other fire finders and a variety of maps, from which he can determine promptly and accurately the location of any fire within his vision. Usually there is equipment for recording weather conditions, which are highly important in foretelling the occurrence, spread and control of fires.

The lookout man must be ever vigilant and have an eagle eye. He must instantly recognize the difference between the smoke from a distant locomotive, a settler's cabin, a logging or sawmill operation, and a forest fire. And he must be prompt and accurate in reporting fires to the nearest ranger station.

With the aid of the C.C.C. and other emergency workers, the Federal and State forestry departments during 1934 and 1935 constructed many new modern lookout stations. But there still remain some 200,000,000 acres in the United States subject to fires which are not covered by modern detection methods.

A Modern Steel Tower of the Type Used Widely Today by State and Federal Agencies in Forest Fire Detection.

THE COMMUNICATION SYSTEM

THE value of the forest lookout depends upon means of rapid communication by which fires can be reported as soon as discovered. The problem is especially acute, because in the average forest region, ranger stations are widely scattered, and settlers and communities are limited in number. In the absence of telephone lines, the early lookout had to use primitive methods of signaling the discovery and location of a forest fire to the nearest ranger station. Flag signals, the heliograph or light flashes, and the time consuming carrying of messages by foot or horseback, were all the pioneer forest officer had to rely on for a communication system.

The telephone has since remedied that handicap. Nearly 50,000 miles of telephone lines now form an essential link in the nation's forest protection structure, thus enabling the lookout man, located on a mountain peak or in a fire tower, to immediately advise the ranger station, or the supervisor's office, miles distant, of the discovery of a fire. The ranger or supervisor immediately dispatches fire-fighting crews, equipment and supplies to extinguish the fire.

In recent years, radio equipment adapted to the specialized and rigorous needs of forest use has been brought into play. Portable two-way sets have also been developed and the radio is rapidly becoming an increasingly important supplement to the telephone communication system. Over 600 sets, portable and stationary, are now in use.

Scientifically Equipped Observatories with Telephone or Radio Communication Today Start Instant Action When a Fire Is Discovered.

In Recent Years, the Tractor Has More and More Replaced Hand Labor in the Building of Trails and Firebreaks.

FIRE--A THREE-HEADED ENEMY

FOREST fires are of three broad classes, ground, surface and crown fires. Each class has called for the development of special technique of handling. A ground fire is one confined to the materials composing the forest floor or beneath the surface, as in peat beds. It spreads comparatively slowly, but is difficult to extinguish. It is commonly controlled by surrounding it with fire lines dug to mineral soil; then extinguished if possible with water.

A surface fire is one running over the forest floor or duff, burning the top layer of duff, the loose debris, and the smaller vegetation. Its spread may be comparatively rapid. When burning freely it may develop one or more heads. Such fires are brought under control with fire lines, and other cleared lanes. They may be beat out or extinguished with dirt, sand or water. Occasionally back-firing is necessary from control lines.

A crown fire is one which runs in the tops of the trees. Crown fires spread very rapidly and are highly dangerous and destructive. A fire-fighting technique, similar to that used for surface fires, is used. Heroic efforts must be made to fell the standing dead trees or snags that burn like torches, spreading sparks for great distances. "Spot fires," started by blazing brands flying far ahead of the main fire, must be caught and extinguished.

TRAILS AND FIREBREAKS

LACK of roads, trails and natural firebreaks, strategically located throughout the forests, have been a handicap to the efficient control of forest fires, especially in sparsely populated and inaccessible regions. Trails and roads are essential not only to provide rapid transportation to the vicinity of a fire but as artificial fire barriers and control lines from which fires could be fought. During the past thirty years, an aggressive construction policy on the part of many States and the Federal Government has remedied in part these original handicaps and made millions of acres of forest land quickly accessible by roads or trails. Over 100,000 miles of trails and 50,000 miles of roads now form part of the country's forest protection system. In addition, some 6,700 miles of firebreaks have been constructed to serve as barriers against the spread of fires and as lines from which safe back-firing can be carried on.

Stopping a Fire Often Calls for Felling Dead Snags Which Burn Like Torches and Throw Sparks Great Distances.

Portable Gasoline Water Pumps Which Tap Streams and Force Water Through a Mile or More of Hose Have Proven One of the Fire Fighter's Best Weapons. Left—A Portable Pump Drawing Water from Stream. Above—the Other End of the Hose on the Fire Line a Mile Distant.

MODERN MACHINERY BROUGHT TO PLAY

WITHIN the past ten years, modern machinery has more and more been brought to the aid of the fire fighter. Portable fuel driven water pumps, which draw water from a stream and force it through a mile or more of hose, are now being used in large numbers as are back-pack pumps, which the men can carry on their backs. In some areas, tank trucks with pump and hose are now used. Ploughs and tractors are proving economical and time-saving in the rapid cutting of fire lines or the trenching of fires. Power driven drills and dynamite are speeding up the removal of snags.

Airplanes are rendering a valuable service in the reconnaissance of large fires and in emergency transportation of men and supplies, especially to remote, back country areas, where hours and sometimes days of hard travel by horse or foot would otherwise be necessary. The Forest Service has cleared a number of emergency landing fields in back-country areas in the National Forests.

Speedy, well equipped fire trucks are maintained by Federal agencies and a number of State and private organizations. They carry portable power pumps and back-pumps, axes, shovels, mattocks, and other tools, portable telephone or radio equipment. They are kept ready to transport crews of trained men on the instant a fire call is received.

Considering the magnitude of the forest area in the United States, the high fire hazards, and the limited funds which have been available for organized forest protection, remarkable progress has been made in forest fire protection. The problem, however, is only partially solved and further extension of forest protection, together with widespread education in fire prevention, is necessary before the huge annual losses from fire in our forest areas can be checked.

THE NATIONAL PARKS

Photography by The National Park Service

WONDER

THE National Parks System was born of wonder. The popular story that Yellowstone was planned to begin a system of National Parks is fiction. Explorers had brought home tales of volcanoes of hot water, boiling mud smelling of the inferno, highly colored steaming springs, roaring pits and glass mountains. When a semi-official expedition found these true, and told Congress that phenomena so extraordinary should become the property of the whole nation, it was made a National Park,—the first. No other was even contemplated for many years.

At that time, 1872, the greater mountains of the West were little known. Both ocean coasts, the Great Lakes Country, the Mississippi Valley, and the Gulf shores were well populated. The Rocky Mountain States were still territories. The plains were still thronged with bison and the mountains with wildlife. The vast western forests bent to the winds virtually unmapped.

The idea of national ownership of great natural spectacles was an inspiration born the last night the exploring party spent in Yellowstone. Around the camp-fire, the party portioned the wonders among them, meaning to file on them under the settlement laws, but a Montana lawyer—Cornelius Hedges—proposed that instead they be preserved by the Government for all the people. The mountain beneath which this decision was reached has been named National Park Mountain.

There are more and greater geysers in Yellowstone National Park than in all the rest of the world put together, and no other canyon displays so many colors.

"Old Faithful" Geyser in Yellowstone.

Mt. Rainier in Rainier National Park, Washington.

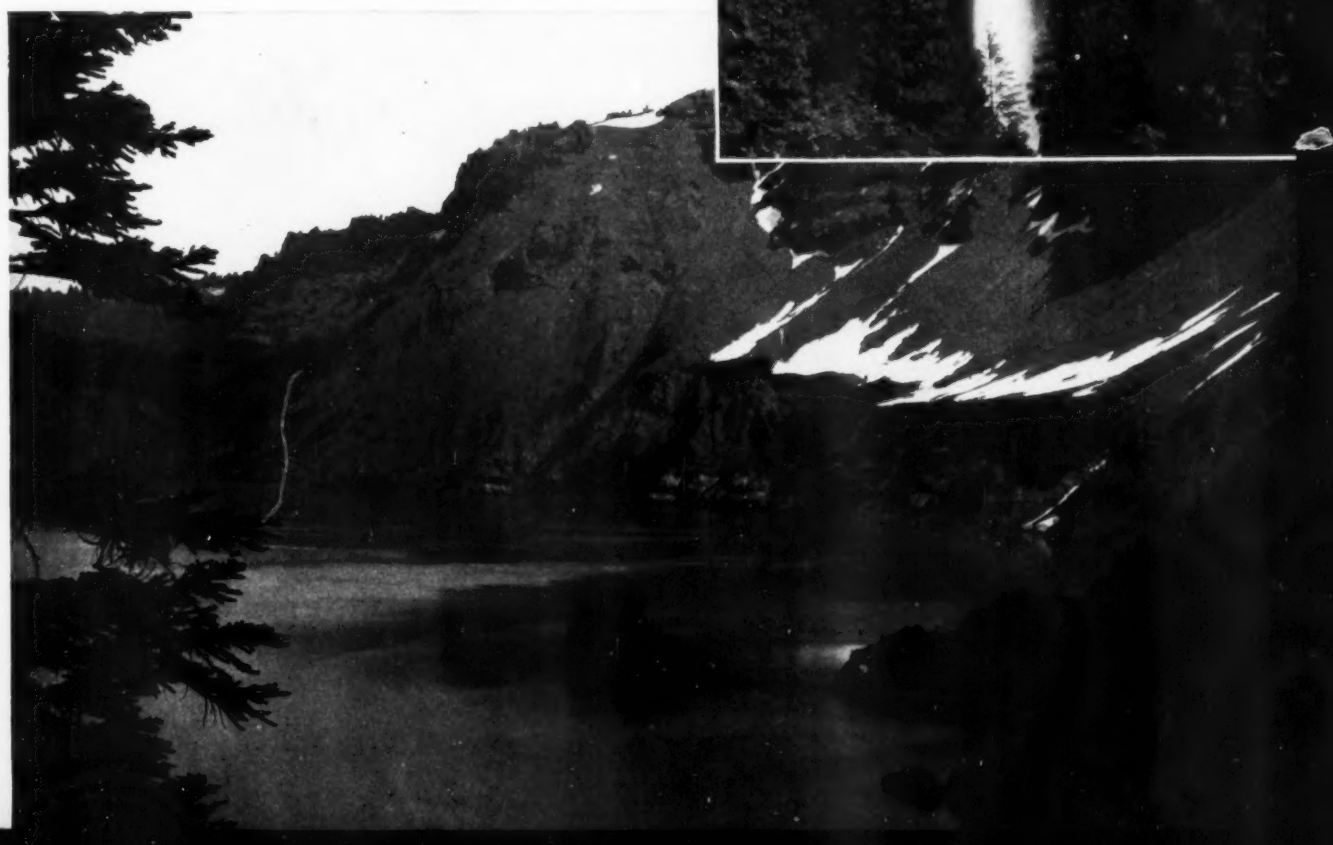
BEAUTY

EIGHTEEN years after Yellowstone, appeared three other National Parks—Yosemite, Sequoia and General Grant. By this time science had explained the wonders, and a cult of beauty had attached to Yosemite Valley, about which much had been written here and abroad. Appreciation once started spread rapidly, finding much to feed upon in the Cascades and the Sierras. The first four Parks were followed by Mt. Rainier in 1899 and Crater Lake in 1902. The motive of the new creations was preservation of supreme natural beauty. Chief of these new National Parks stands Yosemite. The others of the group, each the masterpiece of its type, were volcanic Crater Lake, unique in color and form in the western hemisphere, Mount Rainier, showing twenty-eight glaciers descending a single peak, and Sequoia, and General Grant, the majesty and loveliness of whose "Big Trees" soon supplanted even the wonder of their size and age.

Already Yosemite Valley, as a State Park, had been luring lovers of beauty from abroad. The Nation had given it to the State, but, in the new recognition of its world distinction, the State returned it, and in 1890 Yosemite National Park was created by Congress.

Yosemite is a colossal, elaborate carving, eleven hundred miles square, in the solid granite western slope of the lofty Sierra. Falling from splintered and glaciered summits to include part of the Sierra's famous forest belt of giant trees, its waters rising in perpetual snows, and digging gorges three thousand feet, all within Park limits, Yosemite presents a spectacle of unequalled splendor.

Symbolic of National Park Beauty in the Highest Sense Are Yosemite Falls, California (right), and Crater Lake, Oregon (below).



Glacier National Park with Lake McDonald in the Foreground Is a Resplendent Chapter in the History of Creation.

THE STORY OF CREATION

FOLLOWING wonder and beauty as motives of National Park making, presently appears history. Human history is shown in Mesa Verde, created in 1906; then, most striking revelation, is the History of Creation.

Survey and intensive study of the entire country early begun by the Geological Survey and followed up, during all the years since, with painstaking research by scientific institutions and universities, have developed a continental picture of extraordinary prehistoric range, sequence and detail. Sensational among the great discoveries of the period are the achievements of erosion in washing down the heights, particle by particle of sand and earth, upbuilding the depths, and sculpturing surfaces beyond the most daring conceptions of the past, and in advancement of the age of the earth's surface from a few hundred thousand to unknown billions of years.

To the common eye, scenery falls into three classes which are assignable to grand subdivisions of geologic activity, some slight understanding of which will disclose dramas of earth history that challenge imagination.

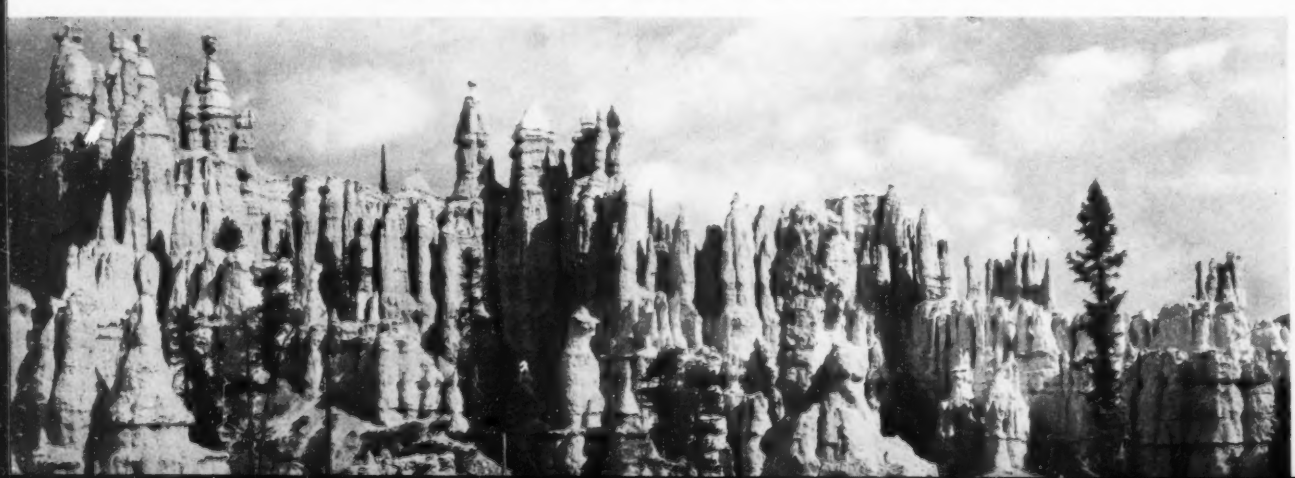
In Rocky Mountain National Park, for example, one finds a nearly perfect example of granitic forms in all manifestations. In Crater Lake and Hawaii National Parks are the most sensational examples in the world of volcanic forms. In Glacier and Grand Canyon National Parks one sees the sedimentary in its most fascinating and stupendous developments.

THE MASTER SCULPTOR

EROSION, Master Sculptor of Creation, inscribes his handiwork on every least particle of the earth's surface, tearing down, building up or decorating. He has been working day and night since there were oceans, lakes, streams, rains, snows, and frosts, for these—and winds—are his tools. The Grand Canyon has been cut down from a potential level many thousand feet higher than its present rim. The first range of the Rockies has disappeared. The sea between the Rockies and the Sierra has been filled up with the gleanings of the mountains, making extensive deserts which are brilliant with wild flowers in the early spring. A lofty mountain range paralleling the Atlantic coast has vanished. The Mississippi Valley lowers yearly, but upbuilds where the current slows at its mouth.

Every National Park is an elaborate museum of erosion's master work, but those in the southwestern desert are most colorful and decorative. Zion National Park shows a sheer-sided gorge three thousand feet deep, revealing the upbuilding work of ages preceding. Two sandstone strata are visible, one blood-red in many shades of weathering, the other, above it, white. The red stratum is of windblown sands, showing that nature is merely repeating an ancient trick today in our Middle West. The white stratum was laid down in deep water. Bryce Canyon National Park is a brilliantly painted niche exposed in still a higher stratum of this same marvelous country.

The Story of Erosion Is Told in Brilliant Colors and Strange Forms in Bryce Canyon National Park, Utah.



SPANNING THE AGES

ON the south rim of the Grand Canyon one faces a straight horizon a dozen miles across, below which many vividly-colored strata appear in the walls, while a crowded city of vast striped pyramids rises from the floor below. The strata are the deposits and records of vast periods of time; among the roots of these, a mile below almost straight down, winds a grim gorge carrying a swirling brown river.

Astounded, one grasps presently that these strata of fantastic conformation and vivid hues span the history of the earth's surface, and that this dark gorge uncovers rock a billion years old, before life (if indeed it then existed) had deposited lasting records. Rising therefrom, the eye searches consecutive strata of creation: That, to begin with, of the age when crustations and algae possessed the earth's surface; then when shell-fish were the highest form of animal life; when sharks ruled the seas and the earliest vertebrates the land, with plants beginning to flower and trees to develop cones; when land reptiles attained heroic size; when flying reptiles begat birds; when mammals attained wide variety and plants their highest development; when, finally, came man.

Later, one learns that by no means are all the ages shown in this one spectacle. Some have been lost by erosion to the long sequence, or have failed to make clear their mark. But one may still get here his first real revelation of the Infinite and his first thrilling conception of creation.

The Grand Canyon of the Colorado Reveals a Thrilling Conception of Creation.

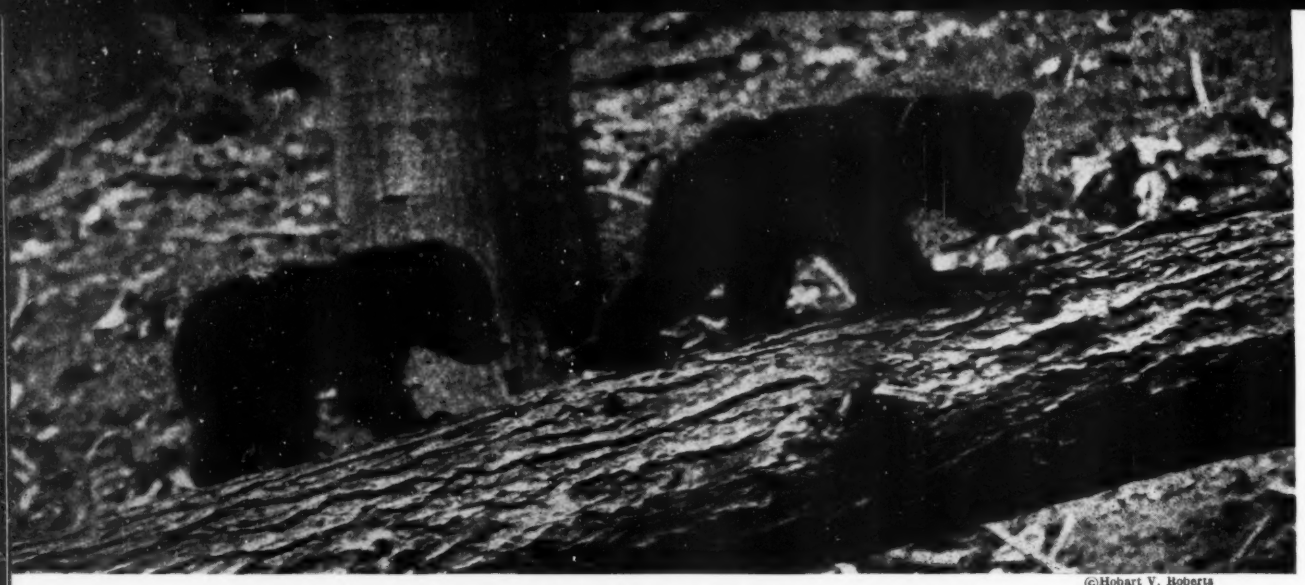
LAST STAND OF THE PRIMITIVE

WHEN fine examples of the primitive disappear from the United States as they have from other major nations, we shall still have our National Parks, "the last stand of the primitive." Fifteen years ago, a few primitive forests still grew east of the Mississippi, and great areas of it blanketed the Rockies, Sierra, and lesser ranges of the far West. Then came motor touring and a mesh of roads from sea to sea including deserts and mountains. Today, in the East, except in Great Smoky Mountains National Park and several National Forests, it is fading swiftly out.

All our National Parks except Acadia in the East and three insignificant parks in the West have large bodies of primitive. Two, Grand Teton in Wyoming and Mount McKinley in Alaska, are all primitive except entrance roads and sites of public camps. Grand Teton is a hundred and fifty square miles of towering, spectacular granite uplift south of Yellowstone and overlooking flat and barren Jackson Hole —a striking contrast. Mount McKinley, chief of the Alaska Range, encloses three thousand and thirty square miles of gorgeous primitive ranging from meadows a thousand feet in altitude to McKinley summit 20,300 feet above the sea.

Lassen Volcanic, Grand Canyon between rims, the cave part of Carlsbad and the mountains of Yosemite, Sequoia, Glacier, Rocky Mountain and others are magnificently primitive. Great Smoky includes the largest area of primitive forest in the East.

The Grand Tetons in Wyoming Are a Towering, Inspiring Mass of Primitive America.



©Hobart V. Roberts

National Parks Are Sanctuaries of Wild Animals and Birds.

WILDLIFE IN NATURAL HABITAT

IN all other land divisions of the United States, except inviolate wildlife refuges, wild birds and quadrupeds are hunted in season under state laws. In National Parks they are fully protected except that where an already rare animal is threatened with extermination, predatory animals such as coyotes may be controlled. In late years, where animals have increased beyond natural food supplies to support them, modern game management is practiced, requiring the removal, yearly, of animals in excess of the number able to find adequate food.

There are mountain goats in Glacier and Mount Rainier National Parks; grizzlies in Glacier, Mount McKinley, Teton and Yellowstone; mountain sheep in Glacier, Yellowstone, Rocky Mountain, McKinley, Teton, Grand Canyon, and Zion; elk in Yellowstone, Teton, Glacier, Rainier, Rocky Mountain and Wind Cave; moose in Yellowstone, McKinley, Glacier, and caribou in vast droves in McKinley. One finds deer and bear in nearly all the National Parks.

RECREATION AS A PARK USE

BEFORE organization of the National Park Service in 1916, neither recreation nor education were popularly associated with National Parks. They were looked upon as great scenic places comparable to the Swiss Alps. In 1915, 335,000 persons visited the thirteen National Parks then existing in the United States, often at some discomfort. The National Park Service introduced the idea of recreation, which motor touring spread rapidly; but the Service was obliged to limit it to activities that do not conflict with the preservation of primitive nature. By 1935, 4,000,000 people were visiting the Parks every year.

An Example of Creation Being Explained by a Park Nature Guide.

Lloyd Photo

THE PARK SERVICE

WHEN the first park—Yellowstone—was created its administration was placed under the Department of the Interior. As other Parks came into being, administration was transferred to a miscellaneous division attached to the office of the Secretary of the Interior. In 1910 civic organizations, led by the American Civic Association and the Sierra Club of California, began urging a National Park bureau. In 1915 Stephen T. Mather was placed in charge of the Parks and through his leadership, Congress in 1916 passed an Act creating the National Park Service in the Department of the Interior.

Mr. Mather carried the National Park ideal in successive stages of growth through early tempestuous years of struggle against interests seeking to commercialize the System. Under him were established the standards which are accepted today by Congress and the people.

Photograph by Hileman.

Stephen T. Mather, on an Inspection Trip in Glacier. Mr. Mather, Founder of the National Park Service, Wrote Its High Standards and Laid the Firm Foundation on Which It Has Risen to the Heights of Public Service Today.

A SUPER-UNIVERSITY OF NATURE

THE idea of education as a primary National Park objective originated also with the start of the National Park Service, but was much slower in development because of official fear lest suggestion of lessons and study would keep people away from the Parks. Its promotion persisted, and in 1925 Secretary Work declared education and recreation as equal objectives. Two years later an advisory committee under Doctor John C. Merriam established education and inspiration of the spirit as major objectives.

The National Park System has been called our Super-University of Nature, not only because it affords opportunity to study wildlife, plant and animal, in primitive condition and natural environment, but especially because it offers consecutive examples of creation from the beginning of human knowledge to the present time.

National Park scenery is by far the greatest in the continent, often in the world, and possesses besides the indescribable glory of the primitive; also, it imparts to mind and imagination a vision of creation, the whole inspiring an uplift of the spirit, sharpening man's conception of his place in life and in the universe.

The System today embraces twenty-four separate Parks aggregating 8,541,000 acres. To many people the distinction between National Forests and National Parks is still confused, although there is a very clear difference. The National Forests set apart natural resources of land, water, forests, forage, wildlife and scenery for economic or commercial use as well as social use under a plan of management that perpetuates the productivity of nature.

The National Parks, on the other hand, set apart areas that represent the highest examples of nature's work of creation, and preserve them as nearly unmarred by man as possible. It has been aptly said that National Parks "represent fully primitive nature, controlled only by conditions which produced the world as we have found it."

Courtesy Yosemite Museum.

The First Picture Made in Yosemite, Where the State Park Movement Had Its Origin. Reproduction of Drawing Made by Thomas A. Ayres in 1855.

THE STORY OF STATE PARKS

YOSEMITE THE FIRST PARK

DOWN through the ages the hand of creation, unseen by white man, fashioned in what is now known as Yosemite Valley, California, a rare masterpiece of natural beauty. Discovered during the middle of the 19th century, reports of its picturesque and inspiring magnitude soon spread throughout the frontier State and gave birth to an idea—that in some way this treasureland of beauty should be preserved in its natural state for the enjoyment and inspiration of all mankind.

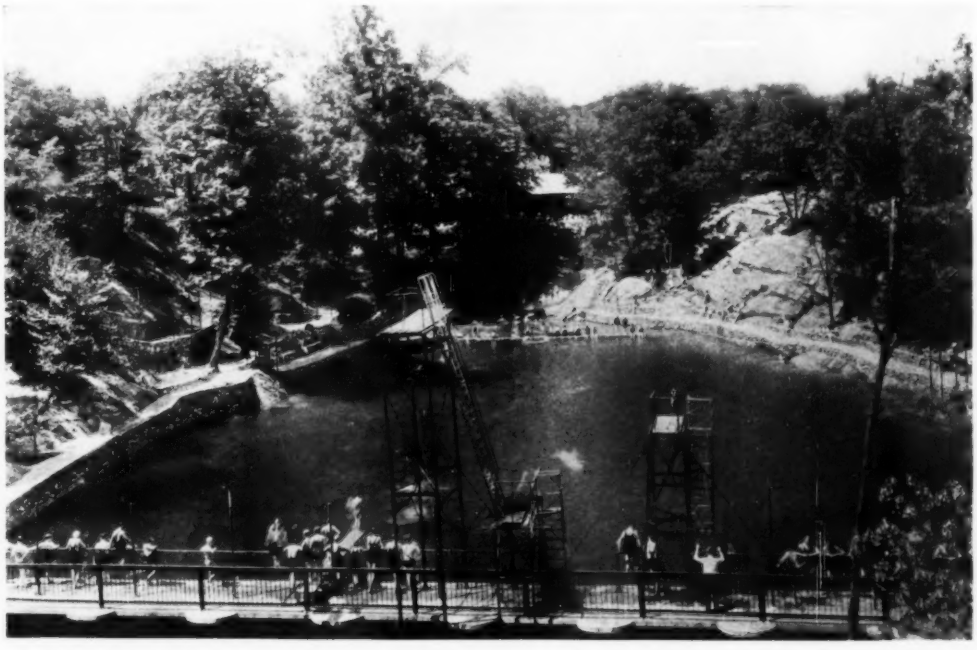
The region was part of the Public Domain of the United States. The gold rush of '49 was in full swing and gold seekers from all corners of the country were swarming into the Sierra Nevada Mountains and blanketing the earth with mining claims. Something had to be done quickly. Congress was importuned and in 1865, seven years before the establishment of Yellowstone National Park, it passed an act transferring the Yosemite Valley and the Mariposa Grove of Big Trees to the State of California for State Park purposes. Actual administration of the area as a park was delayed for several years but it remained in State Park status until 1890, when it was transferred back to the United States to become a part of the much more extensive Yosemite National Park. Thus the origin of the State Park movement, predating that of the National Parks, sprang from the same human emotions to preserve impressive examples of nature's work.

PARK IDEA SPREADS SLOWLY

THE early history of Yosemite embraced, with two or three exceptions, most of the effort expended during nearly half a century in the creation of State Parks. The exceptions were Niagara Falls, which in 1867 people began to feel should somehow be preserved and which in 1885 became New York's first State Park; Mackinac Island, which in the same year was transferred by the Federal Government to the State of Michigan for park purposes; and three smaller parks in Minnesota, one of which, Itasca State Park, embraced the source of the Mississippi River.

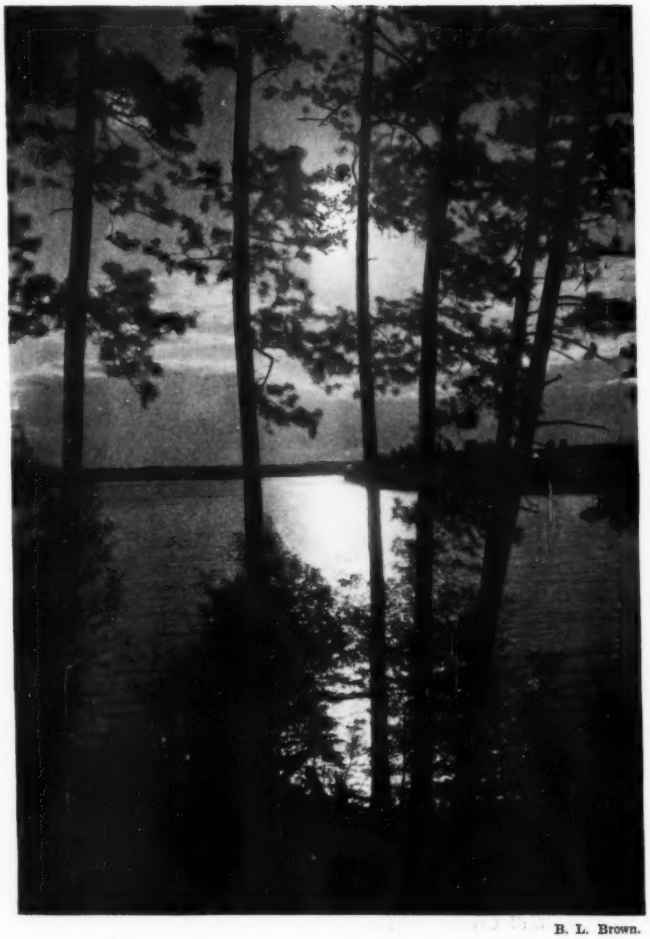
In the several decades following the creation of these public park areas there was a gradual spread of the State Park idea, with Michigan, California, Massachusetts, New York and Illinois pioneering the way. The creation in 1895 of the Palisades Interstate Park in New York and New Jersey saved many miles of awe-inspiring cliffs along the Hudson River.

As between State and National Parks there is today a clear distinction. The purpose of the National Parks is to preserve for all times in as unmodified a state as possible those examples of nature's work that are so rare, unusual or impressive as to possess inspirational and educational values of national and world interest. State Parks, on the other hand, are reservations of areas of local, State or regional interest. While many State Parks possess inspirational and educational value in high degree, the commonly accepted objective is to preserve natural scenery and to provide public areas for recreation.



Right—Scene in Palisade Interstate Park, New York, which Provides Recreation for Millions of People Every Year.

Below — Itasca State Park, Minnesota, Preserves in its Natural Beauty the Source of the Mississippi River.



B. L. Brown.

THE BEGINNING OF PARK PLANNING

CHARLES ELIOT, of Massachusetts, early in the nineties, is credited with having pointed the way to comprehensive park-system planning, and the Trustees of Public Reservations, a semi-official body in that State, was one of the earliest, if not the earliest, organized promoters of such holdings as are now generally referred to as State Parks. In 1909 John Nolen, of Cambridge, made the first State Park survey, for Wisconsin. His report is remarkable for his statement of the need of such parks and of the basis on which they should be selected.

Frederick Law Olmsted's report on his survey for a California park system, which has been the basis of the California acquisition program during the past six years; the Iowa Twenty-five-Year Conservation Plan, and studies made in New York, Illinois, Indiana and other states have given further emphasis to the need of comprehensive planning for State Parks, a need strongly stressed in the recent report of the National Resources Board. Failure to appreciate the need of long-range planning as well as to establish good standards of selection, has resulted in many states including within their park systems mediocre areas, or holdings too limited in extent or of only local importance. These are expensive to operate; and they tend to mislead public understanding of the proper scope and meaning of a system of State Parks.

SAVING THE REDWOODS

THE creation of State Parks was given impetus in 1920 when the late Stephen T. Mather, the Director of the National Park Service, proposed the holding of a national conference on state parks. The first conference was held in January, 1921, in Des Moines, Iowa. Five years later the conference became a continuing organization and has since been a highly valuable influence in promoting the establishment and extension of State Parks and public appreciation of their place in the social life of the State.

No history of State Parks, however brief, would be complete without mention of the extraordinarily effective conservation work of the Save-the-Redwoods League. Under the leadership of Dr. John C. Merriam, the League focused state, national and international attention upon those most magnificent virgin forests of the American continent, the redwoods of California. It aroused the nation to the destruction that threatened them, it raised funds for the purchase of a number of threatened groves, it laid the groundwork for a constructive and enlarged park program for California, whose people by popular vote of nearly three to one in 1928 approved a six million dollar bond issue for the purchase of State Parks. Today nearly forty thousand acres of the California park system are covered with virgin redwoods, with more than seventeen thousand acres, including the famous Bull Creek Flat, in a single park. Complete preservation of the natural beauty and majesty of the century-old forest is the keynote of the State's park policy.

To the Save-The-Redwoods League, California is in Large Measure Indebted for Its Parks of Virgin Redwoods. This Is a View of the World-Famous Bull Creek Flat Forest.

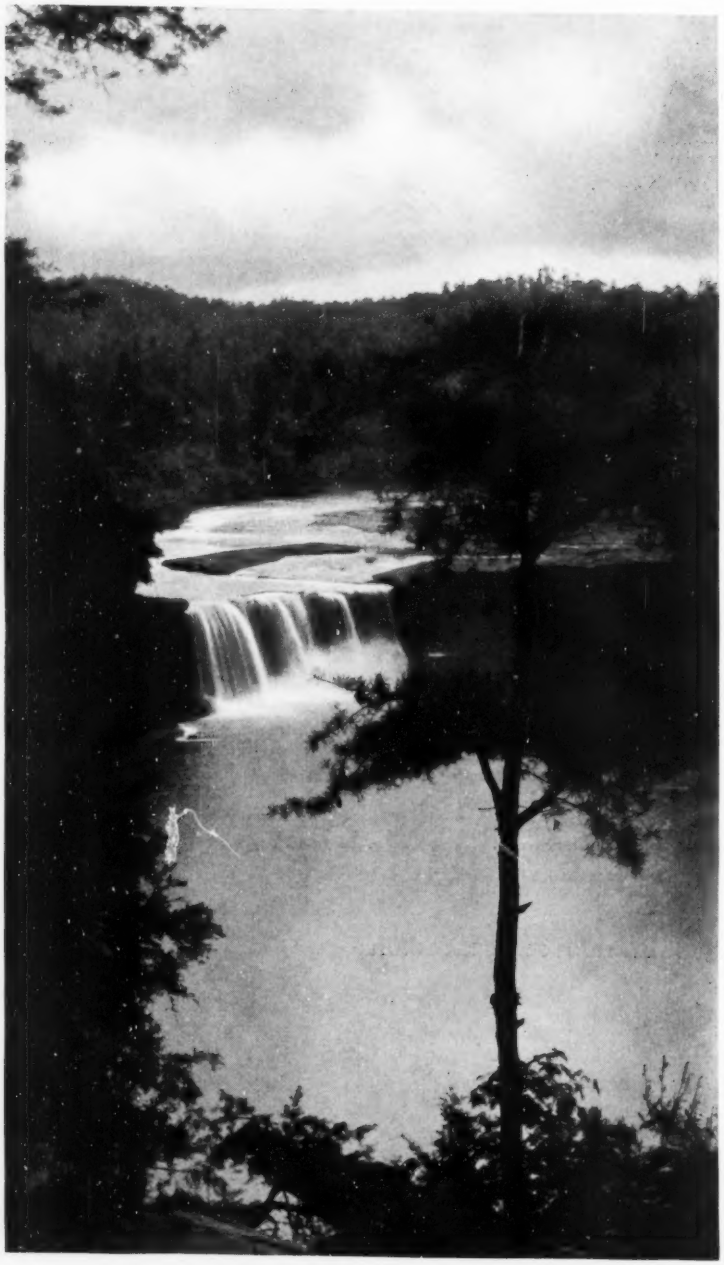
A Scene in New York's Adirondack Park of Over Two Million Acres Dedicated to Complete Preservation of Nature for the Enjoyment of the People.

NEED OF STATE PARKS BECOMES RECOGNIZED

THE automobile, the good roads that have resulted from its popularity, increased leisure for recreation on the part of the American people and a nation-wide awakening to the fact that the native American landscape is being rapidly destroyed or commercialized have all served to emphasize the place of State Parks in the social and economic life of the states. Within the past twenty years the need and value of State Parks has gradually gained wider and wider public recognition with the result that by 1930 many states had adopted definite park policies and were engaged in the acquisition of park areas as funds and donations of land permitted. Leaders in this forward swing of the movement were New York, California, Indiana, Ohio, Connecticut, Iowa, Illinois, Pennsylvania and Michigan.

New York is today, and is likely to be for many years, possessor of the greatest acreage of park lands administered by any state. Her parks are in fact as extensive as those of all the remaining states combined.

Although her two great holdings, the Adirondack and Catskill Preserves, are frequently called state forests, they are really parks in that no cutting of the forest is permitted and the areas are dedicated to the recreational use of the people of the State and nation. Today the Adirondack Preserve contains over 2,000,000 acres, the Catskill Preserve 160,000 acres. In 1932 New York, by a referendum vote of its people, approved a bond issue of ten million dollars for the acquisition of lands for State Park purposes. With these funds the State has increased its park holdings in the Adirondack and Catskill Mountains and in addition increased its parks in other parts of the State.



A Long Struggle Was Required to Make Cumberland Falls, Kentucky, a State Park, But as this View Shows, It Was Well Justified.

CREATORS OF STATE PARKS

THE history of State Parks, like the history of American conservation as a whole, is compounded of triumph and failure, of struggle and disappointment, of profound satisfaction, of generosity and selfishness, of wisdom and folly—of all those things, in short, that are bound to accompany any effort directed toward lasting public benefit. A book could be written about the saving of the Palisades of the Hudson, the Indiana Dunes, the redwoods, or any one of a score of places. Few stories are more interesting than that of the long struggle for the preservation of Cumberland Falls, in Kentucky, but it is only one of many.

That today nearly every state possesses State Parks; that many of these places offer those who visit them a chance "to loaf and invite one's soul" in surroundings of natural loveliness; that in many of them tbe "flow of nature" is allowed to proceed unchecked and birds and animals and plants to live undisturbed—these are the results of the vision, the patience, the unselfishness, the high courage of men and women whose deeds are little sung but whose work will still bear fruit long after they are gone.

HISTORICAL PARKS

CLOSELY associated with the building-up of State Park systems—and too often confused as to name and function with the purely park undertaking—has been the work of the states in preserving and displaying their historical and archaeological treasures. Such properties serve as valuable supplements to the group of somewhat similar Monuments, still far from complete, administered by the National Park Service. Many of them, in fact, undoubtedly possess such importance and distinction as to deserve National Monument status.

Included in this group are such places as the Serpent Mount, in Ohio, said to be the greatest of effigy mounds, and the Cahokia, said to be the loftiest of the works of the mound builders; the Saratoga and Richmond battlefields, both proposed for National Park or Monument status; California's Sonoma mission; the battlefield of Goliad, in Texas; the Lanier Memorial in Indiana, where Americans of today may see the sort of home in which a wealthy and cultured mid-westerner lived nearly one hundred years ago; and the restored New Salem, where Lincoln spent his young manhood. Unique is Indiana's carefully and lovingly reconstructed pioneer village that today lures the visitor to Spring Mill State Park.

Courtesy "Happy Days"

The Development of State Parks Has Been Tremendously Advanced by the Civilian Conservation Corps. Here the Boys are Building an Artistic and Badly Needed Bridge in Park Lake State Park, Texas.

THE C.C.C. FURTHERS STATE PARK DEVELOPMENT

GREAT stimulus was given to the creation and development of State Parks in 1933, when the Emergency Conservation Work's program provided for the use of companies of the Civilian Conservation Corps in performing needed work on state areas. This Federal aid spurred the States to a park acquisition policy with the result that within two years 116 new parks were created in the various states and areas added to sixty-three existing parks. By the middle of 1935, the total area of State Parks in the United States amounted to 3,650,000 acres, an increase during the preceding two years of approximately five hundred thousand acres.

The work of the Civilian Conservation Corps in the State Parks has embraced a great variety of activities designed to develop each park area so that it may serve the highest public use to which it is adapted. These developments have included trail and road construction, the building of picnic and camp grounds, sanitary water and waste disposal systems, control of erosion, construction of adequate administrative buildings and restoration of historical sites.

The Restoration of the Old Pioneer Village of Hamar in Indiana's Beautiful Spring Mill State Park Typifies an Outstanding Achievement in State Park Preservation of Historical Sites.

Above—Picture of the Old Village.

Left—The Village Restored.

THE CONSERVATION OF WILDLIFE

WILDLIFE AND THE PIONEERS

WHEN the first white settlers reached our shores, the Indian was the only human inhabitant, and wildlife abounded everywhere. The "balance of nature" still prevailed, because the Indians took only what they needed for food, shelter, and clothing. No waste characterized their use of game, and traffic in the creatures of the wild was unknown. The original colonists, coming from lands where enjoyment of the chase was restricted to the ruling classes, found here a hunter's paradise. Wildlife, like the forest, was considered inexhaustible and free to all for the taking. Furthermore, game was all important as a source of food, and clothing. It soon became an article of commerce, and that was the beginning of the end for many species.

The fur traders were the real trail blazers. The settlers followed in their wake. The early history of both the United States and Canada was influenced more by our wildlife resources, and the battles which were fought over them, than by desire to possess the land. The mistreatment of two young pioneer French fur traders who penetrated the Great Lakes Region in 1658 is credited with having been largely responsible for Canada becoming an English instead of a French possession.

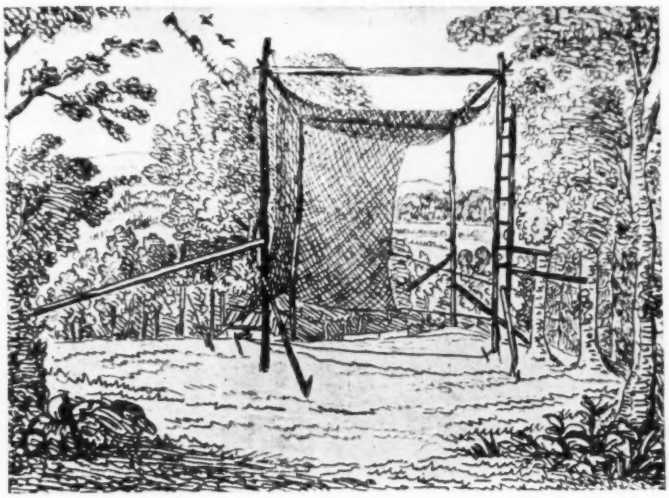
With the opening of the West, and the development of agriculture, the extermination of the buffalo became inevitable. Its valuable coat alone did not bring about its destruction. In some regions, the United States Army aided in its extermination in order more easily to whip the roving bands of Indians into submission by removing their main source of food. The advancement of agriculture, and the wasting of our forests, did more to destroy our wildlife than did the firearms of the pioneer settlers or the sportsmen. This is especially true of our waterfowl, today a pitiful remnant of the former millions which swarmed the sky in migration.

A Currier & Ives Print.

The Buffalo Hunt—A Ruthless Exploit of America's Frontier Days That All But Exterminated the Bison.

THE PASSENGER PIGEON—

Whose Numbers Once Darkened the Skies, Was Completely Exterminated by Heedless Shooting and Trapping.



A Pigeon Net. The Last Passenger Pigeon.

(Reproduced from an old etching)

THE MARKET HUNTER

COMMERCIAL exploitation of wildlife resources was by no means confined to fur-bearing animals. The last of our former myriads of passenger pigeons died in the Cincinnati Zoo September 1, 1914, a race exterminated by trapping and other methods of the market hunter. Many men living today witnessed the wholesale slaughter and carload shipments of these magnificent birds to satiate the demands of city markets. William B. Mershon in "The Passenger Pigeon" estimates that in the last great nesting in Michigan from three to five million birds were slaughtered. Hunting as a business accounted for millions upon millions of birds and animals annually between 1840 and 1910. Dr. William T. Hornaday, in one of his books, cites a professional market hunter who admitted having killed more than 139,628 game birds and animals.

The buffalo, passenger pigeon, antelope, elk, deer and many other species were persecuted and destroyed by the carload, not only to fill the growing demands of city markets, but also to feed the many railroad construction crews and other outposts of the advancing frontier in its sweep westward. Song and non-game birds were killed by the millions for their plumage, demanded by the millinery trade. Market hunting was unquestionably one of the most devastating factors in the decimation of our wildlife. The wonder of it all is that any birds, animals, or valuable fur-bearers are left today.

Pigeon Shooting—"Playing the Decoy"

From "Recollections"—by William B. Mershon.

GAME LAWS

IN the beginning there were no game laws. Wildlife was so abundant that restrictions were not deemed necessary. But gradually the need for protective legislation became evident, and the statutes on the subject now fill many volumes. The first game law recorded called for a closed season on deer in Massachusetts in 1694. In 1739, the first game wardens in America were appointed in the Bay State as "deer wardens." Delaware prohibited Sunday hunting in 1750. By the time of the Revolution, most of the colonies had a few game laws.

The first Federal law, passed in 1776, decreed a closed season on deer in all the Colonies except Georgia. Massachusetts in 1818 prohibited the killing of robins in the spring of the year. New York in 1864 was the first State to adopt a hunting license law, and Iowa in 1878 the first State to fix a bag limit

From "Forest and Stream"—December 16, 1875.

The Deer Had Little Chance Against the "Buck-shot" Hunters of Early Days. Its Protection Was the Object of the First Game Law Passed in America.

on game of any species. About 1885 the American Ornithologist Union, organized in 1883, became active in promoting the protection of North American non-game birds, preparing a model law for states to adopt. Both New York and Pennsylvania adopted the law within five years and by the close of the century more than a dozen states had written it into their statutes.

These meager beginnings have been, especially since the opening of the twentieth century, elaborated and extended in an effort to prevent the destruction of game by legislation. Today the game codes of the states are a veritable maze of inhibitions. But recognizing that legislation alone will not bring back the vanished legions of Colonial days, the Federal Government and many states have in recent years extended their wildlife restoration policies to include not only careful regulation of the annual kill but the development of practical management methods on farm lands, the reservation of portions of the hereditary ranges of wildlife for its permanent use, and its definite inclusion in all land utilization plans involving drainage, the impounding of water, or the withdrawal of lands from agriculture.

EARLY GAME CONSERVATIONISTS

ADVANCING civilization, drainage, agriculture, destruction of the forests, pollution of waters, have progressively taken heavy toll of our wildlife. Breeding grounds have been destroyed by promotion schemes which were economically and biologically unsound. Just as the range of the bison was needed for domestic cattle, so the vast prairies of the North Central States were needed for wheat and corn, cows and pigs. Millions of acres of wildlife habitat were needlessly destroyed, with no benefit to agriculture. Approximately 75,000,000 acres were drained in the United States alone. Added to these encroachments upon wildlife habitats, intensive farming practices, the elimination of the hedgerows and stake-and-rider fences of yesteryear, removed much desirable breeding and feeding cover for game and other wildlife.

Following the Civil War, hunting and fishing for sport became popular. This demand upon our wildlife, added to its constantly shrinking habitats, gave birth to a few pioneers in game conservation. Among the first was H. W. Herbert, who wrote prolifically under the pen name of "Frank Forester." Following him, George O. Shields, George Bird Grinnell, George Shiras 3d, William Brewster, William B. Mershon, William Dutcher, and Dr. William T. Hornaday stand out as pioneers in the cause of wildlife conservation.

In the national field, the first man in high official position to give wildlife conservation real impetus was President Theodore Roosevelt, who by his own example and leadership brought the need for conserving wildlife forcefully to public attention. He set aside many of the early wildlife refuges in the United States by executive order.

George Bird Grinnell, Another Pioneer, Is Still Living and Revered by All Lovers of Wildlife.

H. W. Herbert, Better Known by His Pen Name, "Frank Forester"—a Pioneer Game Conservationist.

ORGANIZED GAME PROTECTION

SPORTSMEN began to organize for the preservation of America's wildlife over a hundred years ago. The oldest organization still in existence, the New York Association for the Protection of Game, was founded in 1844. The Massachusetts Fish and Game Protective Association, organized in 1874, is one of the pioneer state organizations still in existence. No national game organizations appeared prior to 1885, when a group of big game hunters in New York organized the Boone and Crockett Club, the oldest national wildlife conservation organization in existence today. The New York Zoological Society was organized in 1895, under the leadership of Madison Grant and Dr. Henry Fairfield Osborn, and in 1905 William Dutcher, who had served for several years as chairman of a national committee representing several state Audubon Societies, was instrumental in incorporating The National Association of Audubon Societies.

Other organizations, national in scope, formed around the turn of the century were the American Bison Society, the Camp Fire Club of America, and the International Association of Game, Fish and Conservation Commissioners. The American Game Association, founded under the laws of New York in 1911 as the American Game Protective and Propagation Association, has since acted primarily as a clearing-house for organized effort in the restoration of game and fish throughout the United States and Canada. In 1922 Will Dilg and fifty-three friends founded the Izaak Walton League of America, with local chapters throughout the States.

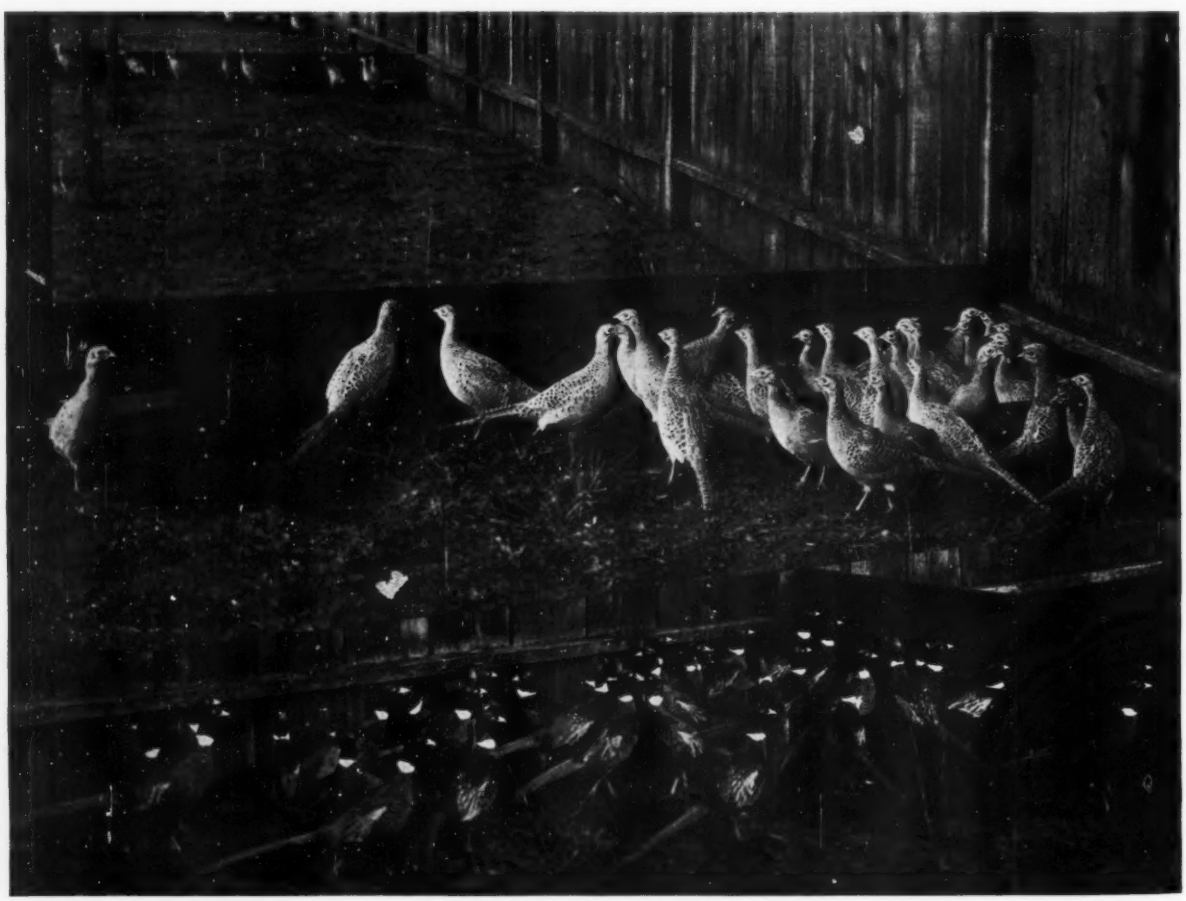
Though not a membership organization, "More Game Birds in America" was organized as a foundation in 1930 to help restore game birds. Supplementing the national organizations today are hundreds of local game and wildlife clubs.

WILDLIFE ADMINISTRATION

WILDLIFE conservation through enforcement of game laws and propagation of game stock is now an established policy in every state; but wildlife management is a comparatively recent conception of public administrative responsibility. It is commonly accepted that wild birds and animals are under state control, excepting birds of migratory habits and wildlife in the National Parks, which by specific acts of Congress have been made wards of the Federal Government. The great bulk of the nation's wildlife resources are therefore in the custody of the States. The first State game commissions were established in California and New Hampshire in 1878. State game administration today varies greatly, but the majority of the States now operate under the supervision of non-salaried commissions as the policy-making body, with State organizations charged with enforcing the game laws, propagation and planting of game, administration of State refuges and promotion of wildlife research.

The Biological Survey of the United States Department of Agriculture began in 1885, as the Division of Economic Ornithology and Mammalogy, under the direction of Dr. C. Hart Merriam. As the principal Federal agency concerned with wildlife, the Survey deals scientifically with the resource in all its aspects. These include the relationship of wildlife to agriculture and forestry and the interrelationships existing between various forms and species, the study of diseases and food habits and the control of injurious forms.

The Survey also has regulatory and administrative functions conveyed by the Lacey Act and the Migratory Bird Treaty Act, and is responsible for the establishment and maintenance of Federal refuges, preserves and sanctuaries for migratory birds and big game animals. It is also the central reservoir of wildlife management information.



Many States Today Are Stocking Wild Lands With Game Birds Raised at State Game Farms. Picture Shows Mongolian or "Ring-neck" Pheasants—Females Above, Males Below—at Oregon's Game Farm, Corvallis.

The Federal Government's Waterfowl Program Contemplates Three Million Acres as Sanctuaries Where Wild Birds May Nest and Multiply Unmolested by Hunters. View Shows a Federal Refuge, Lake Malheur, Oregon.

MIGRATORY BIRDS

THE ducks and geese of North America have decreased with appalling rapidity. Destruction of nesting and breeding areas by reclamation, drainage, and intensive grazing combined with recent droughts and market and sport hunting have reduced migratory waterfowl to a critical point.

Early conservationists foresaw that protection of migratory waterfowl could not be successfully accomplished by the States. The ducks and geese knew no State lines. After a ten years' fight, Congress passed in 1913 the Weeks-McLean Act asserting Federal jurisdiction over migratory game birds of the United States. This was followed by the Migratory Bird Treaty Act of 1918 providing special protection for birds migrating between the United States and Canada. From that date the Federal Government, through the Biological Survey, has assumed responsibility for the protection of migratory birds. Lack of adequate appropriations, however, from the beginning has hampered the work.

In 1929 Congress supplemented this legislation by passing an act authorizing the Federal purchase of inviolate refuges for migratory waterfowl but each year thereafter it consistently failed to provide the funds authorized. Discouraged, conservationists in 1934 secured the passage by Congress of "The Duck Stamp Law" placing a license charge of $1 on all hunters of migratory birds, the revenue to be used in the purchase of breeding grounds and refuges. During its first year, the act yielded $611,959. The Federal program of refuges has been further advanced by allocation of $8,500,000 from various emergency and public works funds. These combined sums have enabled the Biological Survey to acquire a system of Federal wildlife refuges aggregating approximately 1,000,000 acres.

Continuation of the program contemplates the acquisition and restoration of about 3,000,000 acres of land as sanctuaries for waterfowl and other forms of wildlife. A considerable portion of the total area will be within the region formerly used by the migrants as nesting grounds, but other refuges will be established at intervals along the principal flyways to the Gulf. The work will have considerable effect in the stabilizing of water levels and the reduction of soil damage by flood and erosion.

Gloucester Harbor Reflects Changing Conditions in the Fisheries at Large. Graceful Schooners in the Left Foreground Are Being Shouldered Out by Diesel Powered Vessels Shown in the Center Foreground.

THE CONSERVATION OF FISH LIFE

THE DEPLETION OF AQUATIC RESOURCES

ROMANCE in the fisheries is probably no better exemplified anywhere in the United States than at the old port of Gloucester, Massachusetts. Here in the beginning of the 18th century was developed the swift and graceful fishing schooner, which along with the whaling ships of an earlier day produced the bold and hardy race of sea-faring men who established America's naval supremacy in the Western world, and aboard her merchant clippers carried the flag of the new republic into every port on the globe. Indeed, the success of colonization of the American continent was directly dependent upon the abundant supplies of fish along the shores and in the rivers. One of the avowed purposes of the founding of the Plymouth colony was "to serve God and to fish."

With changing world conditions, the fishing industry in New England, paralleled by developments in other localities, has undergone a corresponding change. Shore fishes have been depleted, sail gave way to steam, and a great fleet of ocean-going ships now trawl the banks of the North Atlantic five hundred to a thousand miles from Boston. The application of the internal combustion engine again intensified the fishery in the inshore waters and economical Diesel power is carrying an increased fleet of seiners, drifters and draggers to more remote fishing grounds. Dried codfish is no longer an important article of world commerce. The new market for frozen and packaged haddock in our interior cities now makes it economically possible to exploit with increasing intensity relatively depleted fishing areas.

A foresight into coming conditions was evinced as early as 1856 by the State of Massachusetts when it established an organization for the perpetuation of its aquatic resources. Others have followed so that today every state in the Union has some organization charged with a similar responsibility. In 1871, because of the efforts of the American Fisheries Society, the Federal Government recognized the importance of conservation by establishing the United States Fish Commission, which in 1903 was reorganized into the Bureau of Fisheries. Sportsmen's organizations are working everywhere to restore depleted fish life, both along the shores and in our inland lakes and rivers, which have suffered from over fishing, pollution, deforestation and often drainage. Scientific investigations into the causes of the decreased fish supply and the artificial propagation of commercially important species were the original functions of the new Government department. There has been a gradual expansion of these activities until today both game and commercially important fish are propagated in great numbers and a scientific check of the varying abundance of the fish stock is maintained as a basis for wise regulation.

FEDERAL FISH CONSERVATION

A LARGE share of the activities of the Bureau of Fisheries in biological, technological, and statistical investigations relate to the promotion and conservation of the great commercial fisheries of the sea coasts and on the Great Lakes, as well as to the promotion of sport fishing. The influence of the Federal Government in promoting fishery conservation is effective through its recommendations to the states as a result of its scientific investigations and through its work of promotion involving the propagation of food and game fishes and the stocking of coastal, lake and interior waters, including those of the Public Domain.

The original functions of the Bureau of Fisheries involved scientific investigations of the suspected diminution in the abundance of valuable species, and of the causes of such declines, and the devising of remedial measures. Scientific demonstration of depletion of many commercial fisheries, because of overfishing and the industrialization of the country resulting in stream pollution, has led to remedial recommendations and subsequent reform. Maintenance of the supply of the more highly prized game fishes has resulted from acclimatization, artificial propagation, fish rescue from overflow of lands and improved methods of stocking, all of which have become important phases of the Bureau's activity in recent times.

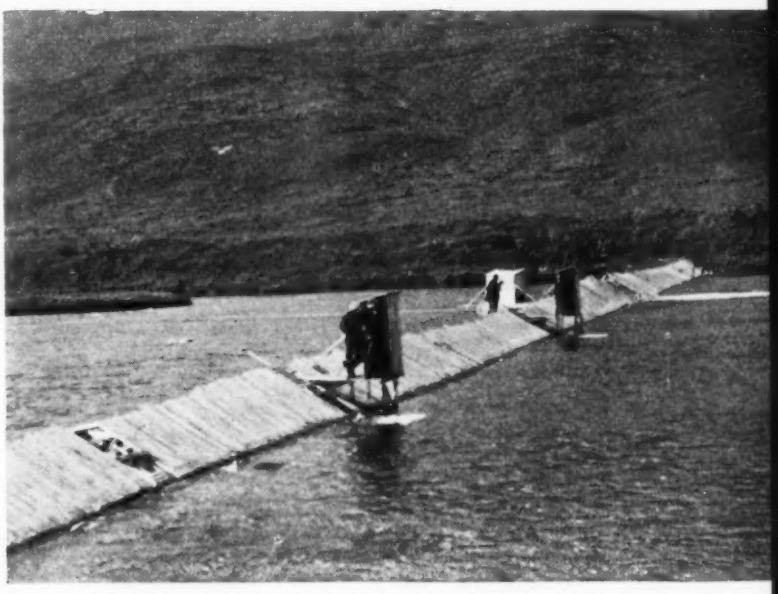
Government Scientists Aboard the U. S. F. S. *Albatross II*, Studying Currents and Temperatures in the North Atlantic in Forecasting the Runs of Haddock and Mackerel.

IMPORTANCE OF FISH LIFE

RATIONAL long time planning and management based on scientific studies of the fish, its environment and the commercial and sports fisheries are recognized as necessary to the solution of the problem of maintaining and increasing our depleted fishery resources. The value of this work is emphasized by the importance of fish life both from the standpoint of industry and recreation.

At the present time the normal annual harvest of our commercial fisheries is nearly three billion pounds, of which about a half billion pounds are non-edible products used in arts and industries. These commodities normally have an annual wholesale value of about $250,000,000. The normal investment in fishing apparatus, shore property, and other equipment is approximately the same amount and the operating capital is about $150,000,000.

Over 200,000 persons, of whom more than 120,000 are fishermen, are given direct employment in the fisheries, and about 300,000 persons are engaged in allied industries. There is no satisfactory way of estimating the economic value of the game fisheries in the United States, but the ten million anglers in the United States, undoubtedly expend many millions of dollars in angling, for which they are abundantly compensated by healthful recreation.



The Salmon Counting Weir on the Karluk River Is One Means of Determining the Number of Fish That Ascend the Stream to Spawn.

Bass Ponds in the Upper Mississippi Wildlife Refuge Yield Thousands of Fish for Stocking Other Waters.

Forest Streams Unspoiled by Silt and Pollution Never Fail to Lure the Angler.

STREAM SURVEYS

THE primary purpose of a survey is to establish the basis for future work in increasing the productivity of a body of water. If the supply of fish in a stream or lake is too low to afford good sport this fact will soon be apparent, but the factors responsible are determined only by a careful survey of the physical, chemical and biological conditions of the environment. Such factors as current velocity, depth, and number of pools, type of bottom, shelter for both young and adult fish, number and kind of food organisms, dissolved oxygen in the water, suspended matter both organic and inorganic, alkalinity, pollution, temperature or permanence of water level may be limiting the fish production. A careful, methodical survey is the only method of determining which factor, or combination of factors, is responsible for the unsatisfactory production of fish.

With the environmental factors evaluated and corrected and a knowledge of the conditions required by the fish, it is then possible to initiate an effective stocking policy. It is obviously unwise to plant trout in waters better suited for bass. Likewise, it is unwise to plant 50,000 fry in a body of water that has food for only half that number. Surveys help avoid the wasteful practice of planting fish in unsuitable waters.

FOREST WATERS

THE forest waters of the United States are the natural habitat of many of our most highly prized game fishes. Conservation agencies have only recently recognized the necessity for a carefully devised plan of management that is intended to operate over a long period of years. Heretofore forest water management has consisted, primarily, of the haphazard planting of fry and then wondering why the plants were not successful. Although the movement is barely begun, much has been accomplished in the rational management of forest waters. First of all, environmental conditions in the streams must be carefully evaluated. Then improvement made with the view of increasing the productivity of the stream and making living conditions for the fish as near the optimum as possible. With a thorough knowledge of the stream at hand, the fish best suited to the particular environment can be planted. It is only by knowing the biology of a stream that the fish production can be raised to a maximum.

The success of forest water management depends on adherence to a well-conceived, rational, farsighted plan that is national in scope, which must go farther than merely putting the maximum number of fish into a stream. It must provide for surveys, stream improvements, fish protection and regulation of fishing seasons and catch limits.

Bureau of Fisheries Scientists Studying Food Conditions of a Stream to Determine Its Adaptability to Stocking.

STREAM IMPROVEMENT

STREAM improvement closely follows the survey work in a program of water management. The survey points out the deficiencies and the improvement attempts remedial measures. Although applicable to both streams and lakes, improvement work has been confined largely to the former. All sorts of improvement structures have been devised to correct the natural deficiencies found in our streams. The current may be speeded up or slowed down, pools may be created, the water deflected so as to undercut banks to furnish shelter, temperature regulated, a more stationary water level maintained, and food organisms increased, all by the use of proper devices. These various improvement devices not only increase the productivity of a stream, but frequently also add to the scenic beauty.

The work of stream improvement is the task of a trained man who not only knows in detail the complete analysis of the stream but also the requirements of the fish. Devices intended to improve conditions but located in the wrong place have been known to ruin completely the fishing in stretches that formerly had been fairly productive.

C.C.C. Boys Building a Resting Pool for Trout in a Shallow Forest Stream.

Trout Ponds at Leetown, West Virginia, Where Breeding Experiments Have Produced a Superior Strain of Brood Fish.

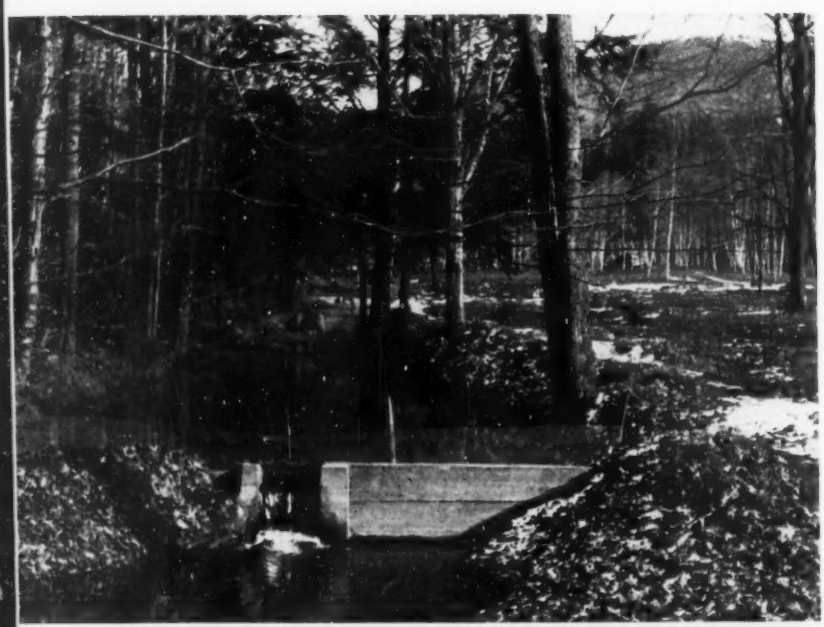
PROPAGATION

ARTIFICIAL propagation is an essential part of fishery management. Depleted streams may be restocked with hatchery fish, and certain species reared in the hatchery may be introduced into suitable waters. The Bureau of Fisheries propagates some forty-five game and commercial species in its more than eighty hatcheries. Also, practically all states, as well as many private concerns, propagate the game and commercial species best suited to the local conditions. As an estimate of the importance of fish cultural operations in the United States, records for the year 1932 show an output of fish and eggs of all species of 7,073,935,000 from Federal hatcheries, and 4,062,366,000 from State hatcheries, all of which were planted in our coastal and interior waters including the Great Lakes.

The propagation of fish extends farther than the mere hatching of the eggs. In order to be of the greatest service to the fisherman, the hatchery must care for the baby fish until they reach the experimentally pre-determined size that allows the greatest survival and fastest growth when the fish are released in nature. One of the most serious stages in the life of an artificially propagated fish, is the step from the hatchery to the stream. Proper planting is as much a part of artificial propagation as is the hatching of a high percentage of eggs.

The Bureau of Fisheries Analyzing Water for Evidence of Pollution.

Dipping Fish In a Modern Trout Hatchery To Prevent Disease.



Rearing Pools Where the Trout Are Held Until Placed in Streams.

STREAM POLLUTION

POLLUTION is not usually so serious a factor in limiting the fish production of forest waters as in agricultural or industrial regions. Sawmill waste and mine discharge are the more frequently encountered forms of pollution in these waters. Pollutants act by either reducing the oxygen supply below the minimum required or by preventing the fish from utilizing the oxygen by mechanically clogging the gills or paralyzing the organs, or by being toxic to either the fish or its food.

Fishes and men have such different criteria for judging pollution that frequently water considered by man as badly polluted may be ideally suited for certain species of fish. Contrary to popular opinion, certain forms of pollution, when not present to excess, are decidedly beneficial to fish life because organic wastes fertilize the water and increase the food of fishes. This is especially true of waters polluted by sewage.

Surveys determine whether or not the paucity of fish in a given locality is due to pollution. Several of the states have agencies whose function is to study the prevention and control of pollution.

RAISING TROUT

FORTY-TWO of the eighty-three hatchery stations operated by the Bureau of Fisheries in 1934 produced trout for the sportsman. Over sixty-six million trout were released directly into sporting waters or turned over to state conservation bodies. In addition to these, nearly forty-four million trout eggs were collected by the Bureau and turned over to outside agencies for hatching. The hatching of trout has expanded its scope so that it is no longer sufficient merely to hatch the eggs, but the hatcheries endeavor to grow them to the largest possible size in the shortest time.

Rearing pools or nurseries have a place of high value in the management of forest waters. The tiny fish produced by the hatcheries must have protection from their natural enemies if they are to survive in numbers. This protection is more certain when given in nurseries than when the fry must find it for themselves. With the strain on the game fish populations becoming more severe annually, the fish nurseries must function at maximum efficiency to help fill the demand that natural propagation cannot meet.

BASS HATCHING

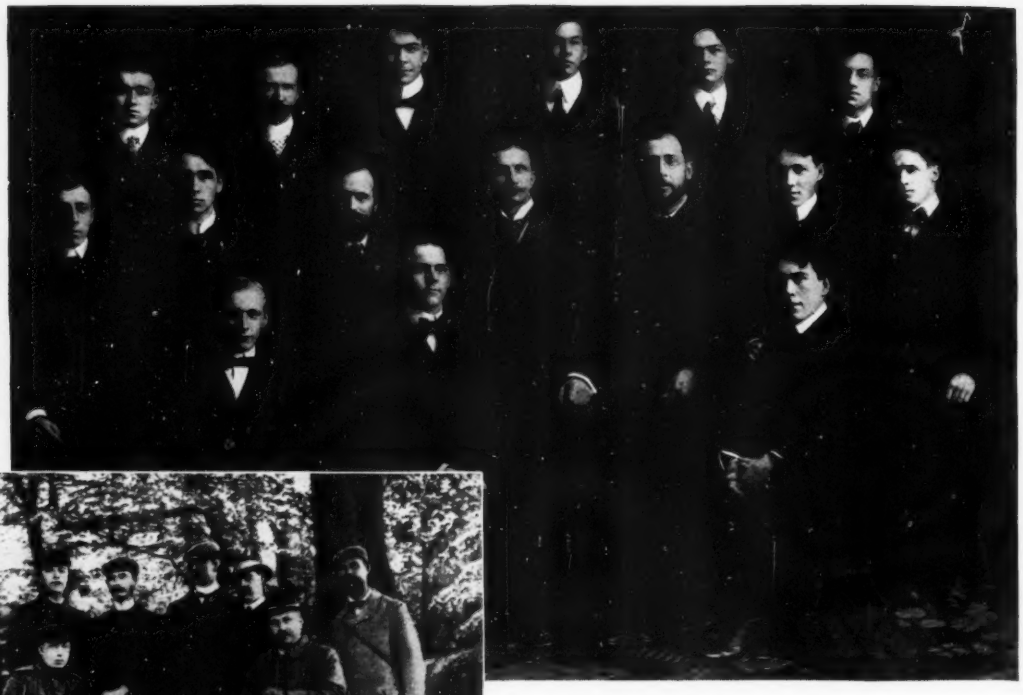
THAT the trout fishermen will not have a monopoly on the sport provided by our forest waters, the Federal Government has joined State and private organizations in bass culture. In 1934 the Bureau of Fisheries distributed six million black bass and over ten million other warm water game fish. Strictly speaking, there is no such thing as artificial propagation of bass or of the other warm water game fishes such as crappie, sunfish, catfish, etc. All that the hatchery can do is to provide ponds having the most nearly ideal natural conditions, and let these fish spawn naturally. After the fry hatch, their survival is increased by proper feeding to reduce cannibalism and care to reduce the fatalities from disease. Since the hatcheries cannot effectively increase the bass populations, strict regulation of bass fishing is essential. All but eight states now prohibit the sale of black bass.

A Bass Pond in the South Where Natural Conditions Are Simulated.

REGULATION

THE states make and enforce fishery regulations best fitted to the local needs, while the Federal Government advises the states but is without authority except in Alaska and in enforcing the prohibition of interstate commerce in black bass. It is to the credit of the State organizations that they have, in spite of selfish interest opposition, continued to advance nearer the goal of better fishing for more people. Paradoxical as it may seem, the rigid enforcement of stringent regulations is absolutely necessary in attaining that end. It is definitely known that fish have a limited capacity to reproduce and grow, and that any body of water has a limit of capacity to support a fish population even under the best of improved conditions. With the fish population limited in these two ways, restrictions such as closed seasons, size limits, and closed areas become obviously necessary as aids in building up the population. Catch limits seek to distribute the all too meager supply among as many fishermen as possible. It is in the regulation of fishing in forest waters that the sportsman-angler has a great opportunity to add to his own pleasure. There may be little harm in one fellow taking a couple of undersized fish or a few more than the catch limit, but if a large proportion of the several million anglers in the country usurp that right, fishing will become a sport of the past. The conservation agencies know how to improve fishing, and merit the cooperation of the sportsmen, the industries and the public in general.

The Cow Pasture Creek Can Be Made to Furnish Excellent Fishing.



Above—The First Forestry Class at Cornell. Dr. Fernow is the Central Figure in the Group.

Left—An Early Group of Biltmore Foresters Visiting Europe in 1901.

The Spread of Forest Education

THE FIRST FOREST SCHOOL

SMALL though the beginning of forestry was in the last decade of the nineteenth century, it nevertheless envisioned a rich field for technical forest practice. Less than half a dozen trained foresters were in the country—men educated in European forest schools. A new profession was in the making and there were no sources of training in America. It was natural, therefore, that leaders of the movement should give thought to the establishment of American schools of forestry. The first to open its doors was at Biltmore, North Carolina, where on September 1, 1898, C. A. Schenck, a German-trained forester who had succeeded Gifford Pinchot as forester for the Biltmore estate, received the first class.

The Biltmore Forest School followed the precedent set by the first attempts at technical forest education in Germany. Young men, who wished to prepare themselves for forestry service, simply gathered around a capable practitioner or "master," who supplemented the teachings in the forest by lectures. Biltmore later became a traveling school, the classes visiting different parts of the United States and Europe. It was discontinued shortly before the outbreak of the World War.

CORNELL ADDS FORESTRY

A MORE ambitious program for the training of technical foresters was the establishment of the New York State College of Forestry at Cornell University and the setting aside for its use of an experimental and demonstration forest of 30,000 acres in the Adirondacks. B. E. Fernow, another German-trained forester who had for many years been active in the affairs of The American Forestry Association and since 1886 had been chief of the Division of Forestry in the United States Department of Agriculture, was chosen as Director. "In thus connecting the forestry school with a fully equipped university, the most advanced German ideas in forestry education are realized," an announcement at the time stated. The course of studies leading to the degree of Bachelor in the Science of Forestry covered four years, the first two of which were devoted to studies of the fundamental sciences and the last two to forestry subjects. The college was discontinued in 1903 because of legislative disapproval of the handling of the demonstration forest in the Adirondacks.

THE SCHOOL AT YALE

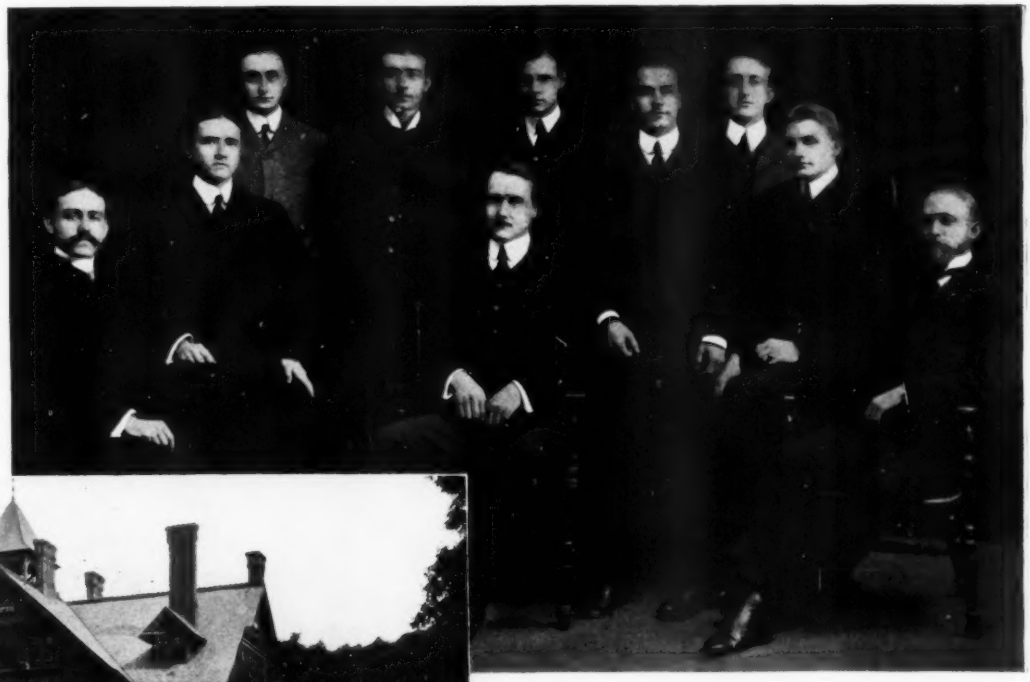
A STILL further advance in the standards of professional education in forestry came with the establishment in 1900 of the Yale School of Forestry, which offered a two-year post-graduate course open only to holders of a bachelor's degree from an institution of recognized standing. The organization of the school was made possible by a gift of $150,000 from Mr. and Mrs. James W. Pinchot and their sons, Gifford Pinchot and Amos R. Eno Pinchot, and constituted "a marked indication of the economic importance attached to forestry both by the donors themselves and by such a master of public questions as President Hadley."

Henry Solon Graves, a graduate of Yale, who had received his forestry training largely at Nancy, France, and who had been superintendent of working plans in the United States Division of Forestry, was chosen as the first director of the school. He resigned in 1910 to become Chief Forester of the United States Forest Service but returned as Dean in 1922. The new school was first housed in Marsh Hall, which with its ten-acre estate served the school until 1923, when it was moved to more commodious quarters in Sage Hall.

AN ERA OF NEW SCHOOLS

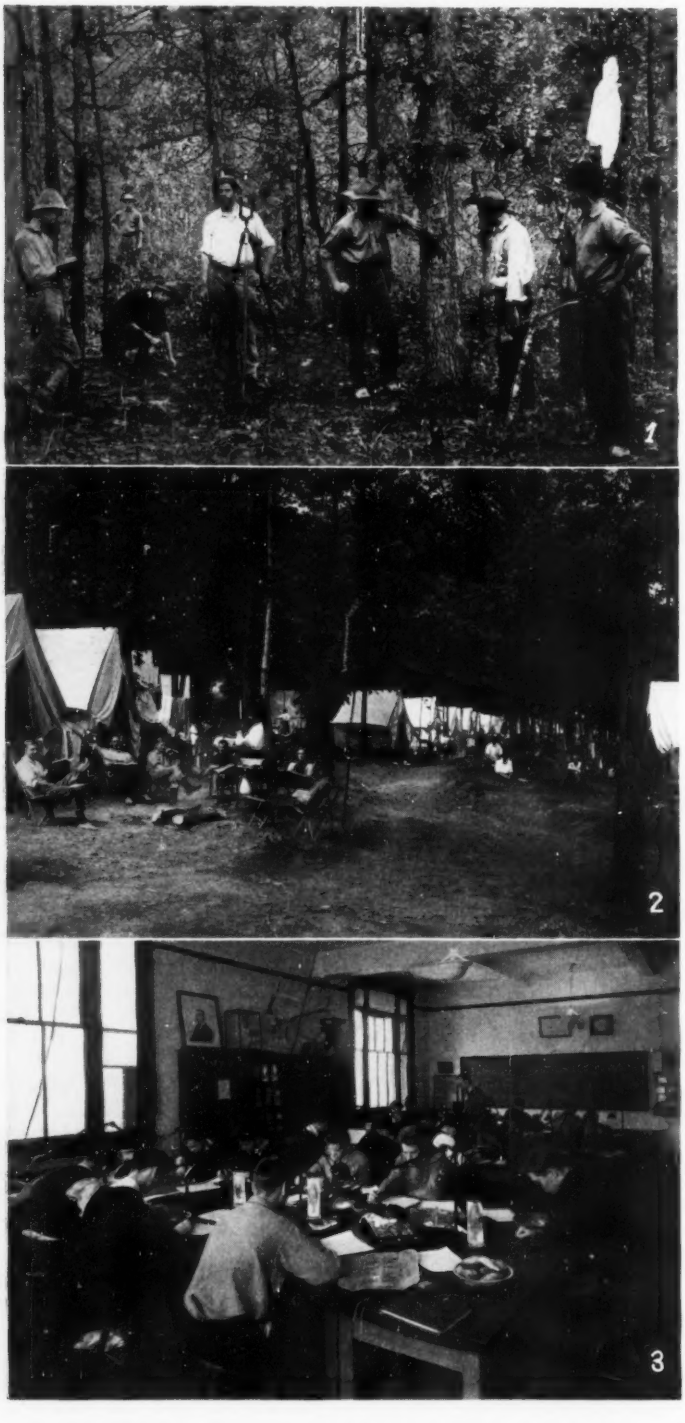
THE growing demand for trained foresters, which received a decided impetus with the transfer of the National Forests from the Department of the Interior to the Department of Agriculture, led to the prompt establishment of other schools of forestry. By 1910 eighteen institutions offered professional instruction leading to degrees in forestry, while today the number has increased to more than twenty. Nearly all of these schools have followed the precedent set by Cornell and Yale in that they are attached to a university or college where facilities are available for instruction in the biological, physical, and social sciences on which forestry so largely rests.

This development has not, however, meant any lack of appreciation of the importance of practical instruction in the woods. Most schools own their own forests, and whether they do or not, provision is almost invariably made for the students to spend a summer or more engaged in woods work.



Above—The First Class at Yale—Graduated in 1902.

Left—Marsh Hall, Where the Teaching of Forestry at Yale Began in 1900.



1—A Class in Surveying Receiving Training in the Woods.

2—The Yale Forest School Camp at Milford, Pennsylvania, in 1908.

3—A Wood Technology Class at the New York State College of Forestry at Syracuse.

BROADER COURSES

THE two most striking changes that have taken place in forest education since its inception in this country in 1898 are the broader scope of training provided for the general practitioner and the greater intensiveness of that provided for the specialist. As forest practice has progressed it has become increasingly clear that the forester's task is not confined to providing the raw material for a wide variety of wood-using industries, but that he is interested in all of a forest's many products and services. Consequently, his training must be broad enough to enable him to produce not only trees but forage, fish, game birds and mammals, fur-bearing animals, and other forms of wild life; to make the forest minister to man's esthetic and recreational needs; and to make it contribute as fully as possible to man's comfort and safety through its influence on climate, health, streamflow and erosion. Today's forester must receive a training broad enough to fit him to handle any or all of these activities.

On the other hand, the need of intensively trained specialists has been recognized and several of the forest schools have added advanced training in practically all of the various branches of forestry.

THE FOREST ENGINEER

THE increased scope of the forester's work has brought with it the need for more comprehensive training not only in the entire field of biology, but also in engineering and economics. Efficient management of a forest property involves much more than the growing of the trees and animals of which it is composed. Equally important are the determination of boundaries, the preparation of maps, the laying out and construction of permanent improvements, and the harvesting and utilization of the trees and other products. More than this, the final result of all the operations involved must be a net return that more than justifies the expenditure, whether this return be in the form of a dollars-and-cents profit as will usually be necessary under private ownership, or in the form of a social income of various sorts as will usually be satisfactory under public ownership.

In order to meet this situation, more and more of the forest schools are placing greater stress on the engineering and economic aspects of the training received by all of their students and at the same time providing opportunities for specialization in these fields.

THE WOOD TECHNOLOGIST

THE broader conception of forestry as a phase of land management which has developed in recent years has been accompanied by increased recognition of the importance of greater efficiency in the manufacture and marketing of forest products. Profitable management of large areas of otherwise valueless land, and the consequent stabilization of the industries and communities dependent upon them, it is now realized, is possible only with a large and steady market for forest products; and such a market, in turn, is possible only as the wood-using industries provide new, better, and cheaper goods that can hold their own in competition with other materials. To do this requires the employment by the wood-using industries of trained technologists who can render the same sort of service as that supplied by physicists, chemists, and engineers in related industries.

Several forest schools have therefore undertaken the development of specialized courses in this latter field. Their aim is to turn out well-rounded individuals capable of rendering expert service as technicians, executives, or investigators, and at the same time to provide opportunity for graduate training for those desiring to qualify as specialists in some particular phase of wood technology.

THE RANGER SCHOOL

COLLEGE training covering at least four, and preferably five years is now considered essential for those wishing to prepare themselves for professional work in either forest production or wood technology, with additional graduate training for those planning on specialization. At the same time, there has developed a distinct need for schools offering less intensive training aimed to fit men for the many subordinate positions in forestry such as forest guards, rangers, cruisers, and nursery foremen for which a semi-professional education is adequate. Training of this sort is offered at such institutions as the New York State Ranger School, which was established in 1912.

Two other types of forest education are provided at agricultural colleges and other educational institutions. The first aims to furnish prospective farmers with the information necessary for the wise management, utilization, and marketing of farm woodlots and their products. The other type of instruction is intended for students who desire definite knowledge of our forests and other natural resources, of the problems involved in their conservation, and of their place in the national economy.

1—A Forestry Class Studying Lumbering in the Woods.

2—Laboratory Work in Forest Zoology at New York State College of Forestry.

3—Main Building of New York State Ranger School at Wanakena, New York.

FOREST EXTENSION

IN addition to the work in forestry at educational institutions of various sorts, from the elementary grades to the graduate schools of the universities, a great deal of education is provided entirely outside of school walls. The most widespread activity of this kind is the so-called "extension" service to owners of forest land. This is usually handled jointly by the United States Department of Agriculture, the State college, and the State forest service, heading up in a State forestry extension specialist who works through the county agents, but in close cooperation with the State Forester and under the general supervision of a similar specialist in the Department of Agriculture.

Demonstrations constitute the most usual means by which the forestry extension specialist and the county agent bring their message to the farm woodlot owner. A tract which is representative of the surrounding region is selected, and the neighboring farmers for miles around are then invited to assemble for a demonstration of how it should be handled.

One of Many Posters Used in the Educational Campaign Against Forest Fire.

OTHER ACTIVITIES

BOTH Federal and State governments engage in a large amount of general educational activity designed to enlighten the public on questions of forest conservation. This includes the issuance of news items, bulletins, and other publications presenting concrete information as to the forestry situation and offering specific suggestions with reference to the management of forest lands and the utilization of their products. Similar information is also made available to the public through lectures, moving pictures, and the radio.

With continued devastation of the forests by fire, much educational effort is wisely devoted to fire prevention. Since most fires are due to human carelessness, special attention is devoted to informing the general public of the seriousness of the fire situation and to educating the individual as to the measures which he can take to avoid contributing to the annual forest fire toll. Posters, stickers, newspaper articles, circulars, talks, movies, radio stories and addresses, educational patrols, and even law enforcement are among the means used.

Education in Forestry Is Reaching the Farmer Through the Extension Specialist, Whose Demonstration Meetings Draw Farmers from Miles Around.

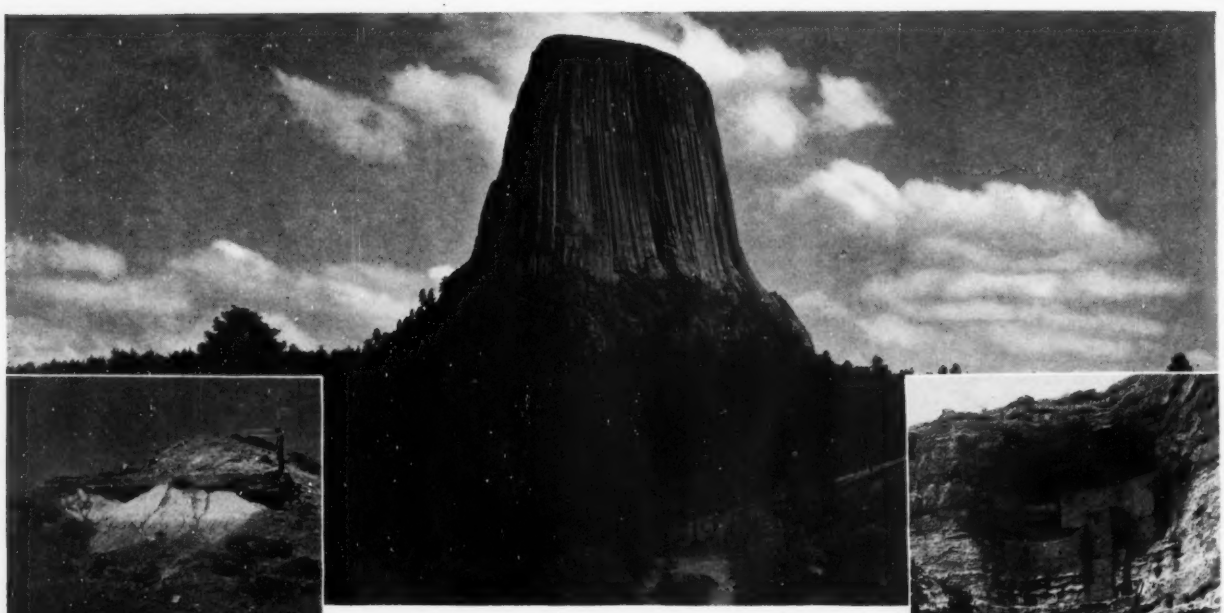
Carrying Forestry Education to the Children—One of Several Motor Trucks Operated by The American Forestry Association in Its Campaign Against Fire in the "Piney Woods."

THE ORGANIZATION FIELD

PUBLIC and private organizations not connected with either the Federal or State governments have played a larger part in forest education than is generally realized. The American Forestry Association, organized in 1875, has consistently maintained popular education as one of its major objectives, and by its activities in this field has contributed to the passage of every important piece of Federal forest legislation and of much State forest legislation. Similar national and many local organizations and numerous State forestry and conservation associations have reached people in a way that no government bureau could have done.

From one point of view, the Civilian Conservation Corps is probably the most extensive educational project ever undertaken in forestry. The continuous assignment of several hundred thousand young men from every corner of the country to the task of rebuilding our depleted resources with their own hands has dramatized the conservation problem in a way that has never before been possible. The education of the boys themselves has been even more direct. They have learned not only what conservation means and the simpler techniques involved in its practice, but their health has been improved, their muscles have been hardened, and they have learned the meaning of cooperation and public service.

The Civilian Conservation Corps is One of the Greatest Educational Influences in the History of American Conservation. It Has Dramatized Forestry to the Public and Taught It to the Boys.



Devil's Tower—in the Black Hills Region of Wyoming.

The Petrified Forest, in Arizona.

Montezuma Castle, in Arizona.

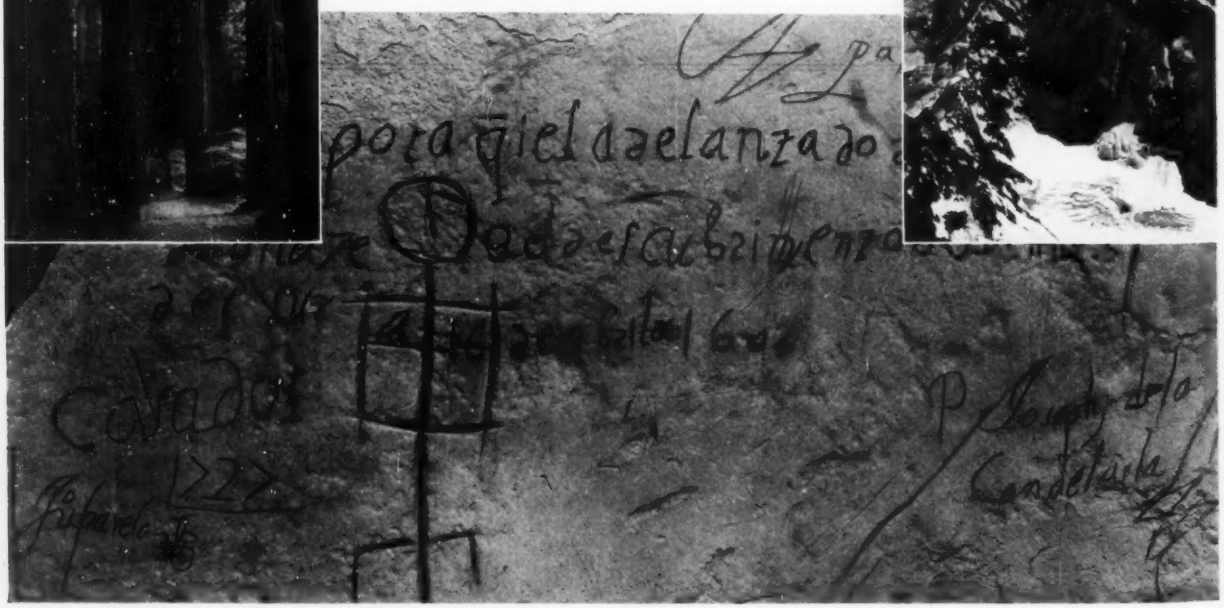
THE NATIONAL MONUMENTS

Photographs by the National Park Service

Muir Woods, in California.

Glacier Bay, in Alaska.

El Morro, in New Mexico—Preserving the Famous Historic Juan de Onate Inscription, dated 1605.



Front View of the Mansion at Wakefield—the George Washington Birthplace National Monument, Showing the Kitchen in the Rear.

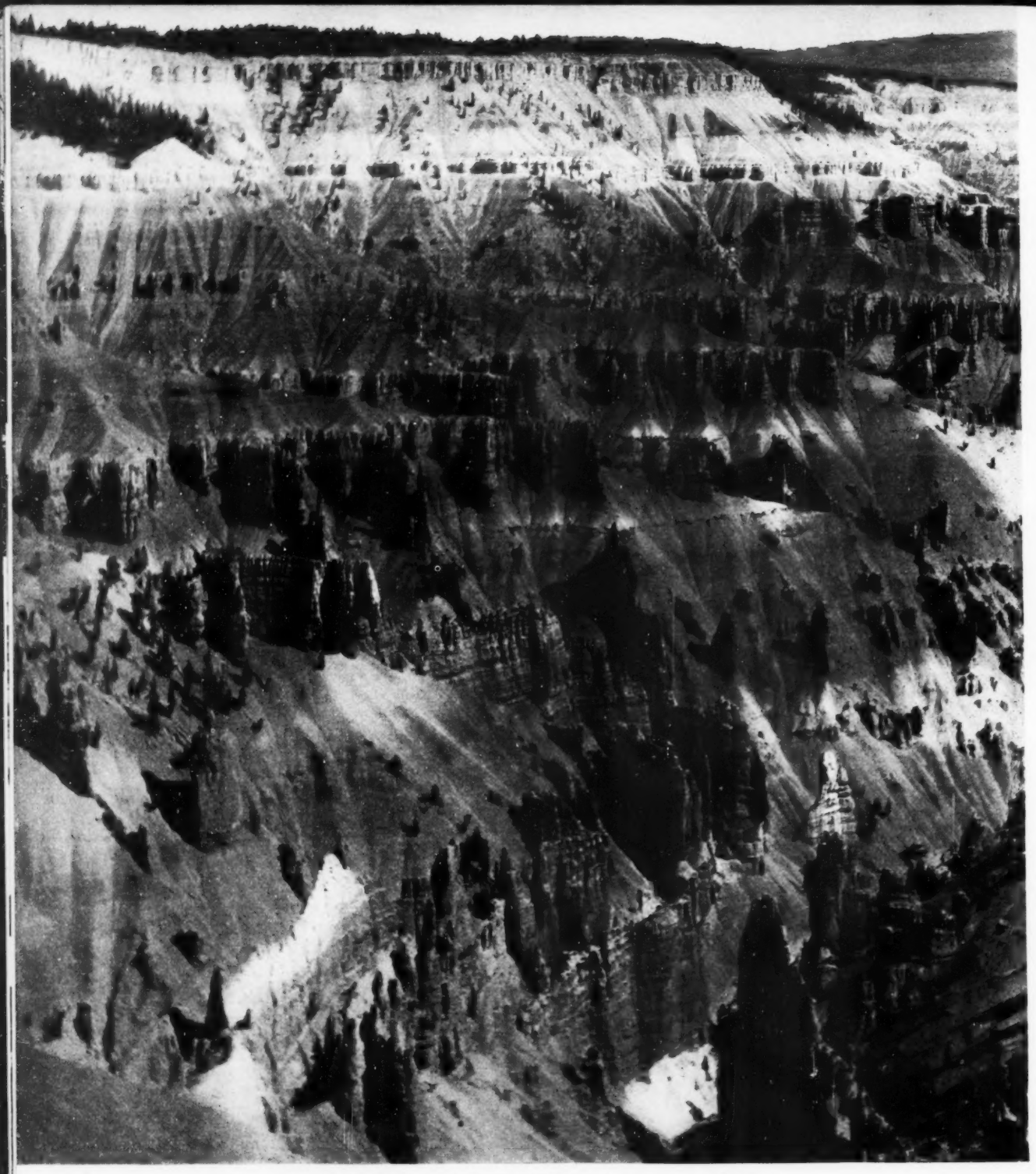
ON June 8, 1906, ten years before the creation of the National Park Service, an act to preserve American antiquities was approved by President Theodore Roosevelt. Under this act the President was authorized "to declare by public proclamation historic landmarks, historic and prehistoric structures, and other objects of historic and scientific interest that are situated upon lands owned or controlled by the Government of the United States to be National Monuments." Devils Tower, in Wyoming, an outstanding geologic phenomenon in the form of a massive columnar structure of igneous rock, came under this category, and on September 24, 1906, claimed the distinction of being the first National Monument to enter the system.

The General Land Office in its report on the Antiquities Act, referred to the importance of the bill to the scientific and historic world at large. The report emphasized particularly the interest manifested in the petrified forest in Arizona, and on December 8, 1906, the Petrified Forest National Monument was established. On this same date Montezuma Castle, also in Arizona, and El Morro, in New Mexico, were proclaimed National Monuments.

In the Petrified Forest are exemplified the vagaries of nature. The colorful stone logs found here are not. as it would seem, the trunks of fallen trees which grew on that spot in the past ages. They were carried great distances to where they now lie, a mass of agate and carnelian, but still retaining the shape of the original trees.

Photograph by George Grant.

The Mount Olympus National Monument in Washington—a Primitive Area Marking One of the Last Wilderness Frontiers of the United States.



Cedar Breaks National Monument, in Utah. A Rare Gem with Great Walls Sculptured in Massive Ridges, Overlaid with a Sea of Vivid Color.

EL MORRO was established to preserve the historic monolith, known locally as Inscription Rock, on which are carved, over Indian petroglyphs, inscriptions by the early Spanish explorers who passed this way in the seventeenth and eighteenth centuries. During that period this huge natural fortress served the colorful caravans of officers, soldiers, and missionaries as a refuge from the hostile Indian tribes as they traversed the Zuni-Acoma Trail between Old and New Mexico.

Montezuma Castle, with some thirteen southwestern National Monuments of this same type, is an outstanding example of prehistoric cliff dweller ruins. Archaeological studies made in these Monuments have brought to light valuable finds in the field of ethnology.

MUIR WOODS NATIONAL MONUMENT, in California, like the Petrified Forest, contains trees centuries old; however, its specimens are living, not fossilized. This monument was created in 1908, to preserve a remarkable grove of *Sequoia sempervirens*, commonly known as Redwoods. Another type of Monument in California, in complete contrast to Muir Woods because of its lack of trees, is Death Valley. Its importance as a National Monument is three-fold—scientific, historic, and scenic. Geologically, the area shows evidence of former extensive lake beds, and saline deposits are present in great quantities. Historically, it is known for the tragic part it played in the long trek of the Forty-niners to California. Scenically, it is a region of colorful canyons and glistening white sand dunes, a veritable land of contrasts.

Another rare gem in the National Monument system, an unusual example of erosion, is the Cedar Breaks, in Utah. Made up of a series of amphitheaters, its sloping walls, furrowed and corroded, are broken into massive ridges which radiate from the center like the spokes of a wheel—all overlaid with a sea of vivid coloring.

In Alaska two vast areas have been set aside as National Monuments primarily for scientific study—Glacier Bay and Katmai. The former, with its numerous tidewater glaciers of the first rank, affords a unique opportunity for the study of glacial action. The latter, containing the "Valley of Ten Thousand Smokes," is a volcanic phenomenon of the first order. Scientists predict that in some future century this valley will become a geyser basin similar to Yellowstone's.

THE Colonial period of American history is perpetuated in the monument system through the creation of the Colonial and George Washington Birthplace National Monuments. The former was established to preserve that section where the Nation came into existence—Jamestown, the first English settlement; Williamsburg, one time capital of the Colony of Virginia; and Yorktown, where British sovereignty ceased.

In the establishment of the George Washington Birthplace National Monument, the place where the first President saw the light of day is saved for this and coming generations. Built on the foundations of the original structure, the birth house of George Washington is as true a representation as it was possible to produce from records available.

Through an Executive Order issued by President Roosevelt in 1933, certain monuments, formerly under the jurisdiction of the Departments of Agriculture and War, were transferred to the Department of the Interior, to be administered by the National Park Service. Included in the group of sixteen transferred from the Department of Agriculture is Mount Olympus, in Washington, the last frontier wilderness of United States proper. The primary purpose for preserving this primitive area was to protect the rare Roosevelt elk found there. Another important factor in its preservation was the saving of the majestic forest of Douglas fir, spruce, and hemlock remaining in this area.

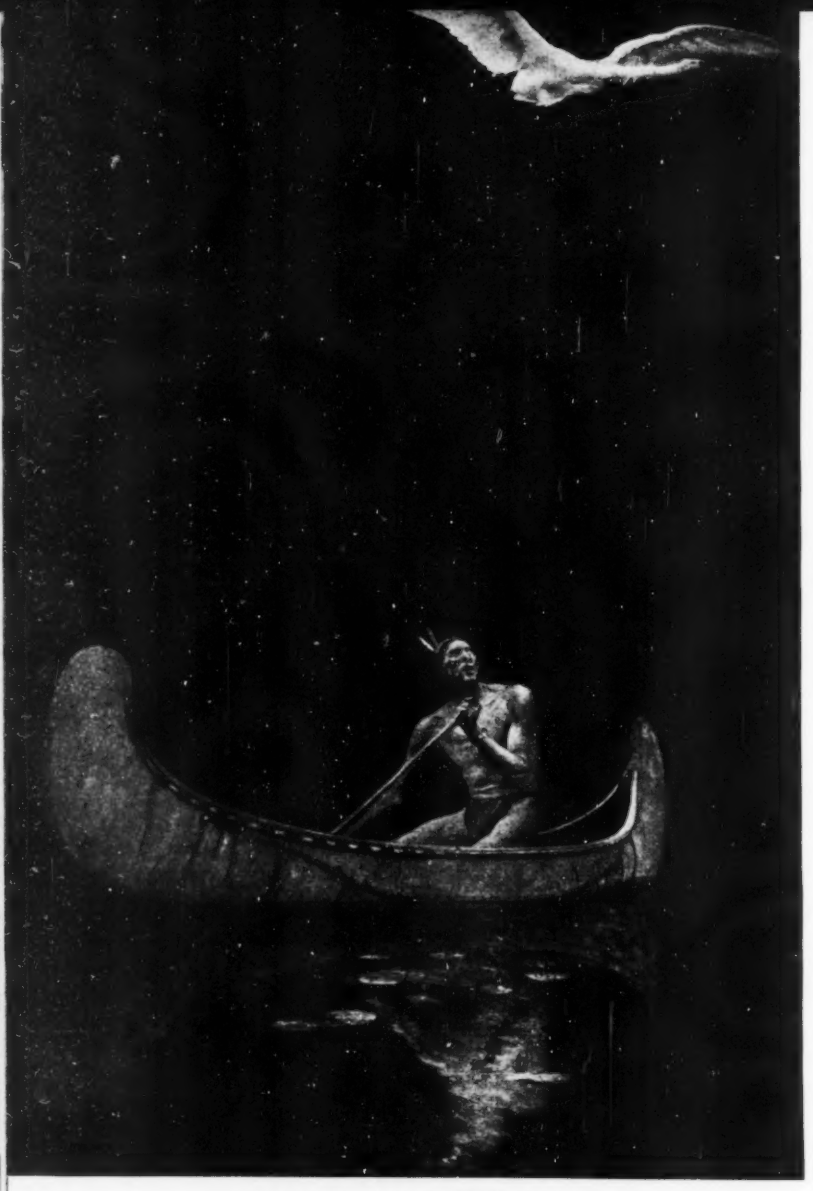
The Statue of Liberty, formerly called Fort Wood National Monument, is one of the ten historic areas transferred from the War Department. The statue, which represents liberty enlightening the world, was a gift of the French people, intended to commemorate the centenary of American independence in which they played such an important part.

Photograph by Allen Rinehart.

A Night View of the Statue of Liberty, formerly known as Fort Wood National Monument.

The pedestal upon which the statue stands was a contribution of the American public.

The National Monuments under the National Park Service, which in 1908 numbered four, have increased to sixty-eight. The last to be included in the system is historic Fort Jefferson, in the Tortugas Keys off the southwest coast of Florida, which became a National Monument on January 21, 1935.



"THE SILENCE BROKEN"

Painted by George de Forest Brush and Exemplifying in Eloquent Terms, on Canvas, the Romance and Poetry of Primitive Indian Nature.

INDIAN FORESTS

THE INDIAN'S WOODED ESTATE

OUT of the entire domain which the United States bestowed upon the Indians during the past century, in meagre exchange for a whole continent, only a small part remains today in Indian ownership. Through a process of legalized encroachment, the Federal Government has permitted the Indians to lose nearly a hundred million acres of land during the past fifty years; what remains is far too little to give them even a fighting chance to earn a living from the soil. Fortunately, of the fifty-one million acres of land still owned by, or held in trust for the Indians, some eight million acres are valuable forest lands, capable under wise management of producing a large permanent income in money, timber, and wages.

Under the Wheeler-Howard Indian Reorganization Act of 1934, the Department of the Interior is required to handle the Indian forests on a permanent, sustained yield basis, which means limiting the annual or periodic harvest of timber to the amount of wood grown during the period. Moreover, the Reorganization Act has put an end to the system of allotting tribal lands to individual Indians, and has thus broken up the devastating inroads already made through unwise allotment of Indian timberlands to individual indians. Thus has been achieved in large measure what the Indian Forest Service long strove to do: to establish permanent Indian forests, handled on a permanent community basis.

A basic part of the new Indian policy is to give the Indians a much larger share of responsibility in solving their own problems and creating their own destiny. Historically, the great weakness of Indian policy has been that everything has been done for the Indians, and not by them. The most fundamental part of the Indian Reorganization Act is that which permits the Indians to organize for self-government and for cooperative economic enterprises. The Indian country is teeming with a greater excitement than it has known since the end of the Indian wars. The tribes are discussing their future in a fresh spirit of hope and energy.

The New Indian Policy Seeks to Give the Indian a Chance to Solve His Own Problems. Handling of Indian Forests, by the Indians, Is Part of the Program. These Northern Plains Indians Are Discussing the New Plans.

For Over Twenty Years the Government's Policy Has Called for the Cutting of the Indian's Timber According to Forestry Practice. Photograph Shows a Lumbered Area in the Apache Reservation, New Mexico.

INDIAN FORESTRY

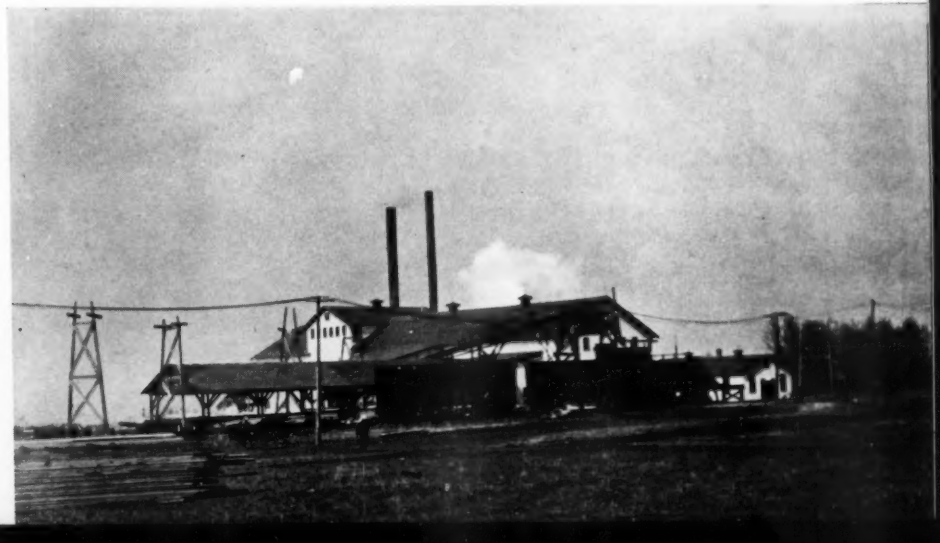
THE first important step toward the management of the Indian forests was taken in 1909, when Congress established a Forestry Division in the Indian Service. In the following quarter century the technical forestry personnel increased from two to about sixty, while the number of experienced woodsmen, rangers, and other forest protectors, increased to about 200. Compared with the National Forests, the Indian forests are seriously undermanned, particularly in the field of fire protection. The Indian Forest Service during the past quarter century with few exceptions, has not developed Indians as technical foresters and as trained rangers and guards. A definite start toward establishing a technical and supervisory Indian personnel has recently been made by the Indian Service.

The uncertainty of Indian land policy involved in the allotment system greatly hampered the Indian Forest Service in the past. The policy of alienation of Indian lands, steadily pursued by the Government for fifty years, brought great pressure on the Forestry Division to cut forests more heavily than is permitted under strict sustained yield management, in order that the Indians might receive the greatest possible return from the timber before they lost the land. Nevertheless, the silvicultural practice has been such as to permit the continuous reproduction of the forests following cutting.

FORESTS FOR INDIAN WORKERS

WITH a few notable exceptions, the Indian Service has followed the policy of selling timber by contract, and permitting the contractor to do the logging and the sawmilling. In theory, the Indians are supposed to receive the preference for employment as woods-workers; but this provision has been largely violated, with the result that the Indians, though realizing cash income from their timber have largely lost the wage income incident to their logging and sawmilling. A conspicuous exception to this practice is the Red Lake Indian Forest in Minnesota, comprising 110,000 acres, which was set aside for permanent management by Congress in 1916. In 1924 Congress authorized the construction and operation of a sawmill as an Indian industry on this reservation, and during the following ten years the Red Lake Indians, operating the industry themselves with some white supervision, earned a wage income of $435,000, and a cash income from the sale of timber products of $312,000. The Menominee Indians also have a very large modern sawmill, and from 1930 to 1934 earned $684,000 in logging and milling wages.

The present policy of the Indian Service is to terminate as rapidly as possible the system of contract logging, to build small sawmills, and to put the entire operation in the hands of the Indians themselves.



An Indian Sawmill in the Red Lake Reservation, Minnesota, One of Two Which the Indians Themselves Have Operated.

Indian Woods Workers in the Yakima Reservation, Washington.

THE INDIAN AS A FORESTER

FORESTRY and woods work are ideal occupations for Indians —suited to their temperament, mode of life, and traditions. The present Federal policy looks to an Indian Service ultimately to be manned by Indians. To achieve this goal requires a break with many past traditions of Indian administration and an energetic effort to systematically give Indians the type of vocational and professional education required for Indian administration. To this end, the Indian Reorganization Act authorizes a yearly fund of $250,000 for vocational and professional training of Indians in all technical fields required for Indian administration. Forestry will play an important part in this new program.

The Indian C.C.C. Is Rehabilitating Indian Lands.

Considering the large deficit in land and capital goods which mirrors the tragic plight of the Indians today, the possibilities of sustained yield forest management as a part of the solution of the hitherto baffling "Indian problem" loom large. Even on a very conservative estimate, the Indian forests, under the relatively extensive management that is possible today, will yield an annual cut of about 415,000,000 board feet. At current timber prices, the income from stumpage alone would amount to $1,260,000, and the income from wood growth alone to somewhat more than $4,000,000. These figures on income will be largely increased as Indian operated sawmills are established and Indians receive wages and profits involved in the manufacture of forest products.

THE INDIAN C.C.C.

THE Indians' capacity for constructive work has recently been shown by their response to the Indian Emergency Conservation Program, established under the Act of March 31, 1933, which created the Civilian Conservation Corps. Recognizing the potentialities of this program, the Indian Service obtained authority to establish Indian Emergency Conservation Camps, which have employed on the average 12,000 Indian youths and men. So eager was the response of the Indians to this opportunity that it has been necessary to rotate the available jobs through a rapid turn-over of personnel. During the two years ending March 31, 1935, nearly $20,000,000 was expended in this program. Truck trails, horse trails, telephone lines, fire lines, lookout towers, and ranger cabins have been built. Substantial areas of promising young trees have been released by improvement cuttings in many of the Indian forests. As immense areas are situated in the Great Plains region and the arid Southwest, much of the Emergency Conservation Work has been devoted to developing wells and small stock watering reservoirs, and the building of fences and other range improvements. More than three thousand reservoirs for stock watering have been built, an equal number of springs developed, and hundreds of wells dug or drilled. But most important of all, multitudes of Indian men have been trained in the art of steady and constructive work and in the elements of good land management.

SOIL EROSION AND WILDLIFE

THE Indian Conservation Program extends far beyond forestry. Approximately 40,000,000 acres of Indian lands are grazing lands, which are under the supervision of the Forestry Division. Great progress has been made in the past two decades toward bringing these lands under proper management for the protection of the forage and the soil. But much remains to be done. Great areas have been so badly over-grazed that they are in urgent need of drastic erosion control measures. Notable in this respect is the vast Navajo Reservation, in Northeastern Arizona and Northwestern New Mexico, comprising some 15,000,000 acres of semi-arid land. In recent years the Soil Conservation Service, in collaboration with the Indian Service, has carried on a program of stock reduction and erosion control, designed to check the gullying and to capture and spread over the soil the water that means life to the Navajo and his sheep and broader opportunities for Indian agriculture.

Under primeval conditions, with a continent teeming with wild game and fish, the entire prehistoric Indian population lived largely by hunting and fishing, supplemented here and there by primitive agriculture. The white man not only concentrated the Indians on poor lands, but largely wiped out the vast buffalo herds, the deer, elk, moose, and the smaller animals, which were the chief food supply of the Indians. Moreover, the Indian Administration has never worked out an adequate game and fish management program for the Indians, with the result that the Indian reservations, with some exceptions, are now among the most poorly stocked game ranges of the country.

The new Indian policy, though handicapped by lock of funds and personnel, is initiating a constructive wildlife program for the Indians. Under the Game Coordination Act of 1934, the Secretaries of Interior, Agriculture, and Commerce are required by Congress to work out game and fish management plans for all the Indian reservations.

INDIAN REHABILITATION

THE Indian forests, besides being important sources of wage income and money, are valauble to the Indians in furnishing a cheap supply of building materials. The proposed Indian sawmill projects will greatly aid in providing better housing for the Indians, which is one of their greatest needs. A social and economic survey of eighty reservations, with an Indian population of 123,000, reveals exceedingly bad housing conditions. Approximately 1,400 families out of a total of 4,000 families were living in one-room cabins or shacks; 1,200 families were living in two-room houses, and only thirty-five per cent of the families in houses of three or more rooms. Poor housing, combined with insufficient food, largely accounts for the fact that the Indian death rate is three times that of the whole American population, and the tuberculosis death rate seven times.

Progress has been made in the past, in spite of inadequate funds, in improving housing and health conditions, but the work has only begun. Now, with the collaboration of the Land Resettlement Administration, the Indian Service is about to begin a program of Indian rural rehabilitation, including simple but adequate housing, on about fifty-five reservations. In this housing program the Indian forests will on many of the reservations furnish cheap building material, and reduce material costs.

Courtesy, Soil Conservation Service

Doorway of an Indian Home in Harvest Time.

Lumber for a Better Housing Program for the Indians.

Mount Pisgah, Surrounding Which the First National Forest Was Created Under the Weeks Act in 1916.

THE NATIONAL FORESTS OF THE EAST

THE FIRST IDEA

THE creation of the Pisgah National Forest, in North Carolina and Tennessee, in 1916, not only brought to fruition a movement which began as early as 1885, but started the Federal Government, through the operation of the Weeks Act, passed by Congress in 1911, upon a program of establishing a system of National Forests in eastern States. Preservation of the beauty and health-giving qualities of the Southern Appalachians is credited with having given birth to the idea of eastern reservations. These values were stressed when governmental acquisition was first advocated around 1885 by two medical men, Dr. Henry O. Marcy, of Boston, and Dr. Chase P. Ambler, of Asheville.

The First National Forest Reservation Commission on Mount Pisgah Conducting Negotiations for Federal Purchase of the Lands.

THE FIGHT FOR PISGAH

THE proposal of Doctors Marcy and Ambler created wide interest throughout the southern Appalachians with the result that a definite conservation plan took form in 1899, when the Appalachian National Park Association was formed at Asheville, North Carolina. Early in 1900 a memorial drawn up by the association was presented to Congress, and that body appropriated $5,000 for a survey of the region. This investigation focused on forest conditions, the influences of forests on the streams and soils, and the adaptability of the region to forestry and recreation. It dictated a new course for the sponsors. The National Park idea was abandoned for that of a National Forest, and the association changed its name to the Appalachian National Forest Reserve Association.

Having exhausted its resources, the association in 1905 asked The American Forestry Association to assume the task of organizing national support for legislation that would open the way to the Federal acquisition of land for National Forests. This the Association did and, after six years of persistent campaigning, Congress in 1911 passed the Weeks Act. In 1915 the Government acquired nearly 87,000 acres around Mt. Pisgah, then part of the vast Biltmore estate of George W. Vanderbilt. In 1916 this area was proclaimed by President Wilson as the Pisgah National Forest—the first National Forest to be created in the East.

THE WEEKS LAW

THE National Forests of the West had been created from the Public Domain, but as the East had no government-owned lands, the Weeks Law was passed by Congress "to enable any state to cooperate with any other state or states, or with the United States, for the protection of the watersheds of navigable streams, and to appoint a commission for the acquisition of lands for the purpose of conserving the navigability of navigable rivers." The law authorized the purchase of private lands for National Forests.

The selection of forest lands for acquisition was lodged in a National Forest Reservation Commission, consisting of the Secretaries of War, Agriculture and Interior, two members from the Senate selected by the President of the Senate, and two members of the House selected by the Speaker. In 1913 the first commission, headed by Secretaries Garrison, Houston and Lane and accompanied by Chief Forester Henry S. Graves, went south and began the initial negotiations that later resulted in the first purchase of an eastern system of National Forests that today extends into many states.

THE PURCHASE POLICY

DURING the first thirteen years of operation of the Weeks Act, two and a quarter million acres of land, mostly cut-over, were placed under administration as National Forests. These units dotted the Appalachian Range from the White Mountains of New England to the southern extremity of the Blue Ridge. In 1924, Congress passed the Clark-McNary Act, broadening the Weeks Act by authorizing the purchase of land for timber production as well as for stream flow protection. This extended the field of eastern National Forests to the level forest lands of the Lake States, the South Atlantic and the Gulf Coast States.

In its purchase of lands, the Government for almost twenty years confined its selections largely to lumbered areas that could be obtained cheaply. In 1920, the purchase of 22,000 acres of virgin spruce and hardwoods as an addition to the White Mountain National Forest in New Hampshire marked a deviation from this policy. Since then the acquisition of virgin stands of timber, when suitably located for administration, and when of public value for esthetic, protective, demonstrational or economic purposes, has found a place in the purchase program.

THE NEW DEAL

FROM the passage of the Weeks Act in 1911 to July 1, 1932, the Government established twenty-four National Forests in nineteen States east of the Great Plains. Their combined area approximated 5,000,000 acres, purchased at a cost of $23,336,000. President Franklin D. Roosevelt, who came into office the next year, gave the Eastern States an impetus far beyond anything its most zealous advocates had hoped for. In 1933 and 1934, the President allocated $30,000,000 of emergency funds for National Forest land purchases. As a result, the areas of Eastern National Forests more than doubled within two years. By the middle of 1935, the total area amounted to over 16,000,000 acres and the eastern system extended into twenty-three States, from New Hampshire and Vermont to Texas, with projected units in half a dozen additional States.

During the First Twenty Years, the Government Confined Purchases Largely to Second Growth Lands as Typified by the Above Section of the Nantahala National Forest, Georgia.

More recently, an additional allotment of $15,000,000 for land purchases has been made by the President. Notable among the new purchases is the so-called Tionesta tract of 17,000 acres in Pennsylvania. This is part of the largest remaining forest of virgin hemlock and hardwood remaining in the eastern United States. Under the government policy, the mature forests, except where more valuable for scientific, demonstrational or recreational uses, will be administered under a plan of sustained yield forest management, designed to stabilize the local communities.

In Recent Years, the Policy Has Been Broadened to Include Areas of Mature or Virgin Forests, Such as This Stand in the Allegheny National Forest, Pennsylvania.

View of One of the Pioneer Experiment Stations Established by the Forest Service—the Fremont Station on the Pike National Forest, Colorado.

FOREST RESEARCH

EARLY GROPINGS

FOREST research in the United States has grown from the early work of botanical explorers such as Michaux, who revealed our wealth and diversity of forest resources. Exploitation and rapid destruction of forest resources led to the establishment of a Federal Division of Forestry in 1876 to make a statistical survey of the forests and the rate at which they were being depleted. This exploratory and advisory service constituted a large part of the work of the small group of foresters available in the country prior to 1900; however, it established certain silvicultural principles and constituted the first serious American investigative effort. In giving advice, reliance was placed on keen observation of the results of past cutting practices and analogy with European conditions and experience.

As the number of men professionaly trained to manage and administer forest land grew it became apparent that the training was not entirely adequate. Much of it was based directly on Old World experience and while the broad principles could be applied directly, the specific details seldom fitted American conditions. Furthermore, the management plan work was largely restricted to the East and conditions on the Forest Reserves in the West presented entirely new problems. Within three years after the reorganization of the Bureau of Forestry into the Forest Service, in 1905, a series of local experiment stations was established, the first of which was located at Flagstaff, Arizona. Others were near Colorado Springs, Carson, Washington, Priest River, Idaho, and Quincy, California. For the most part, the stations were located at isolated places on the National Forests where the men assigned to the task could work on purely local problems.

THE NATIONAL VIEWPOINT

IN 1915, in conformity with the policy adopted by the Department of Agriculture, the need for a continuing policy in forest research was recognized by the formation of a Branch of Research in the Forest Service. The action paved the way for a unified, nation-wide attack on the obscure problems of American forestry. The limitations of the local independent experiment stations under local forest officers soon became apparent. The World War emphasized the value and need of forest research and gave rise to the idea of a coordinated national system of regional forest experiment stations.

This idea, developed in "A National Program of Forest Research," finally culminated in the McNary-McSweeney Act of 1928, which authorized the establishment of a series of regional Forest Experiment Stations, and the prosecution of research in each of the major fields of forestry. Under its authority it was possible to coordinate work in many fields of effort and to develop a national program. Thereafter, forest research made rapid strides not only in the Federal field but in the forest schools, States, and under private endowment. Fellowships for advanced graduate study on forestry problems were provided by various agencies and foundations. State organizations provided for research in fire control and forest management.

The changes in forest research have not been limited to mere expansion of personnel organization and physical equipment; there has been a corresponding advancement in viewpoint and methods of attack employed by the research staff. Investigations have turned more and more to instrumentation and to statistical analysis for aid. Ingenuity and resourcefulness characterize the development of every line of work.

Preparation of Forest Management Plans During the Early Days of American Forestry Laid the Beginning of Silvicultural Research. Here is a 1903 Cruising Party in Tennessee.

FOREST MANAGEMENT

VERY early in the life of the Federal forestry organization, timberland owners became interested in having trained foresters examine their lands and prescribe management methods. These studies of the past treatment of private lands laid the beginnings of silvicultural research. With the growth of the National Forests, this extension research was expanded to include them.

Each expansion of forestry brought new problems, new species, and new conditions. At first, these silvicultural problems were attacked by broad studies of cutting methods, by extension of sample plots and by surveys of cut-over lands. Forest schools not content with classroom work and book knowledge soon undertook experimental work on school forests and at summer encampments where the effects of different methods of treatment could be followed from year to year. The bewildering array of combinations found and the lack of uniformity in results obtained quickly led to a more intensive and careful inquiry into controlling factors. Step by step the investigations were drawn into more and more detailed studies. Seed production, ecology, physiology, pathology and soil science have been found fruitful fields of study and each has yielded its contributions to silviculture.

FACTS ABOUT FIRE

IN addition to being the most spectacular enemy of the forest, fire has been probably the most difficult to foresee and combat. Even though foresters have tried desperately to eliminate fire from the woods they have repeatedly been overwhelmed when bad years, such as 1910, 1919, and 1929 came along.

Before 1910, studies of fire were confined to administrative compilations of numbers of fires and area burned. Following this disastrous year, however, the search began for a "measuring stick" for forest fire hazard that would give warning of the approach of dangerous conditions. This led to a formalized attack on the whole problem and a study of all of the items contributing to fire danger. From these have come an understanding of what constitutes fire weather, and means of translating field observations into adequate preparation for dangerous conditions.

In the same field, studies extended to the most effective placement and distribution of men, equipment, roads, trails and communication system; the perfection of suppression equipment and the use of animals and machines for fire lines. These and other problems have carried fire research into physics, optics, mechanics and engineering. Of late, the use of airplanes, dirigibles and chemicals has been tested.

To Develop the Most Scientific Methods of Combatting Forest Fires, Research Has Delved Into all Phases of the Subject. Here Investigators Are Studying the Behavior of an Experimental Test Fire.

Developing Nursery Technique Through a Scientific Study of Environmental Factors and Seedling Growth.

FOREST PLANTING

FOREST planting and reforestation played a large part in the early activities of the Forest Service. Some of the first studies were made in 1908. With time, it became apparent that haphazard or rule of thumb methods in the selection of species and in the methods of producing stock or field planting were not successful.

"Tests of species" in which several kinds of trees were planted in adjacent plots were among the earliest experiments carried on. Studies in nursery technique too were soon found necessary. As planting became more widespread, more and more certainty was demanded of the results. Nearly all the nurseries of the various public agencies producing forest planting stock are now engaged in studies of nursery problems such as the control of diseases or insect pests, the use of fertilizers, and the production of well-balanced sturdy stock.

In striving to achieve certainty of results research has had to go to the laboratory as well as the field. In the laboratories and greenhouses of forest schools, forest experiment stations, and botanical institutions, much research now centers around such problems as the development of methods of increasing the germination of seeds, methods of storing seeds to be held over for several years, and methods of testing germinative capacity. The Institute of Forest Genetics, the only one of its kind in the world, is carrying on work in heredity, selection and tree breeding to improve the growth and yield of forest trees.

CULTURAL METHODS

WITH a continent of virgin timber it was but natural that the first, and for many years the only, forest activity should have been the utilization and exploitation of the resource. Early foresters in this country devoted a large portion of their thought to devising methods of cutting which would assure a new stand to replace the one removed. European experience, on which so much of our early efforts were based, clearly indicated that the development of the young forest could not be left entirely to natural processes if the greatest returns in quantity and quality of wood were to be obtained. As a result, cultural experiments were soon started in the available immature stands. Although widespread this activity was local and haphazard. Several developments served to stimulate further interest in working out improved cultural methods. The depletion of virgin supplies, especially in the East, emphasized the importance of second-growth as a source of wood products. Today there is scarcely an agency engaged in forestry that has not initiated experiments in cultural methods.

Methods of relieving reproduction of desirable species such as spruce and pines from the competition of less desirable ones, of achieving increased growth and quality through thinning, of reducing insect damage through control of composition, and of increasing the production of other forest products such as turpentine, game food and cover, and forage, are among those developed and put into practice.

Precise Records Over a Period of Years Determine the Best Degree of Thinning to Increase the Growth of Trees Left.

Experiments in Extracting Gum From Southern Pines Have Shown How to Increase Production and the Life of the Trees.

NAVAL STORES

WHEN the early Colonists made pitch and tar from pine wood, there were plenty of trees and labor was cheap. With the development of the wooden shipbuilding industry, simple, wasteful methods of tapping pines for their resin were developed, the common practice being to chop a hollow, or "box" in the base of the tree to catch the resin, and then to chip wide, deep faces permitting the resin to flow. This method caused heavy losses in the stand from fire and wind-throw and comparatively small amounts of resin were obtained. These primitive, wasteful methods continued in practice until the cup method of catching the gum was developed. In the last ten years, detailed studies of more conservative methods of obtaining the gum have been devised. Experiments with narrow faces and shallow clipping soon demonstrated that the productive life of a tree could be prolonged three to five times and with minimum damage to the tree. Now that the relations between yields of gum are known to be dependent on the size and vigor of the individual tree and even on the weather, the way is paved for placing naval stores production on a scientific basis. Thus the results of studies in naval stores production are contributing directly to the maintenance of an important industry.

FOREST INFLUENCES

THE effect of forests and other vegetation on streamflow and water conservation has long been a moot question, despite the fact that it is one of the most important in the whole field of conservation. To furnish facts, the first American study of the effect of forests on streamflow and erosion was begun in 1910 by the United States Forest Service at Wagon Wheel Gap, Colorado. This study of paired watersheds settled some disputed points but because of conditions under which it was carried on, was not conclusive. In the meanwhile, floods, mud flows, damaging erosion, and water shortages were becoming more and more common. A number of local studies were made between 1910 and 1930, but until the work was organized in the forest experiment station following a special Congressional appropriation in 1930, comparatively little headway was made. Today more than half of the Forest Experiment Stations have active work under way to determine the extent to which the forest benefits streamflow and affects the local climate. Since 1930, many agencies have been studying the relationship of vegetation to water. These studies are bringing quantitative support for the earlier impressions of the beneficial effects of forest and other plant cover on erosion and streamflow.

The Wagon Wheel Gap Station in Colorado—the First Experiment Station to Study the Relation of Forestry to Stream-Flow and Erosion.

An Experimental Herd in Utah on a Mountain Range Where Application of Scientific Findings Has Increased the Forage Several Times.

THE FOREST RANGES

RANGE research, which furnishes the basis of sound range land management, has been conducted at least on a small scale by the Department of Agriculture ever since the nineties. In 1907 the Forest Service initiated range investigations on National Forests, and in 1915 it was made responsible for the range research program of the Department of Agriculture, including that on both National Forests and other public lands. In 1928 the McSweeney-McNary Act, authorized the expansion of this research to private lands as well. The work is now under way at five western forest and range experiment stations, and on the National Forests generally, in cooperation with other Federal and State agencies. Western state experiment stations are also conducting range studies.

Range research includes studies of the growth, restoration, protection, management, and utilization of range resources on forest and other range lands, and studies to harmonize grazing by domestic livestock with watershed protection, timber production, wildlife management and recreation.

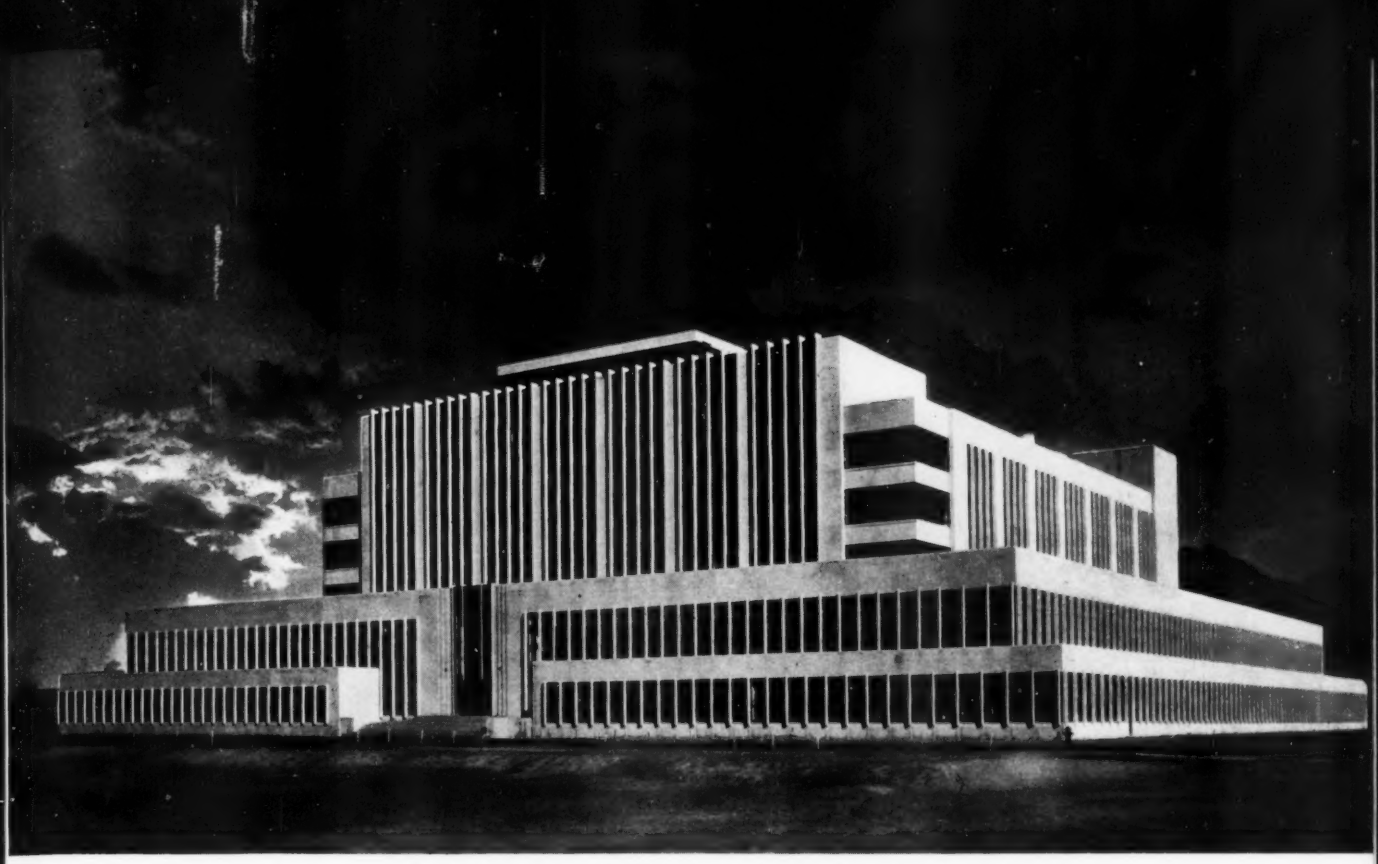
Investigations of the Forest Service to date have enabled correction of many abuses on the National Forests and have aided in stabilizing the use of range lands, and the development of dependent communities.

THE FOREST SURVEY

THE Forest Survey is an activity of the Division of Forest Economics of the United States Forest Service, authorized by the McSweeney-McNary Act of May 22, 1928; and begun in 1930. It embraces a nation-wide inventory of the extent, location, and condition of forest lands; the quantity, kinds, quality, and availability of timber now standing on these lands; the rate of depletion through cutting, fire, insects, disease, and other causes; the current and probable future rate of timber growth and the productive capacity of our forest area; and the present and probable future requirements for forest products in the different parts of the country by all classes of consumers, including many major industries. It also includes analysis of the relation of these findings to one another and to other economic factors as a basis in formulating policies, principles, and plans of forest land utilization. It involves both field surveys and the compilation of existing data from a great variety of sources.

The survey is being conducted in the South, Lake States, Northern Rocky Mountain region, the Pacific Northwest, and California. Field work has been completed in the Douglas fir region of the Pacific Northwest, and for the States of Minnesota and Mississippi.

The Forest Survey Will Answer Many Unknown Questions Concerning the Remaining Timber Supply. A Survey Crew in the Mississippi "Bottoms."



The Forest Products Laboratory at Madison, Wisconsin, Where the Government's Studies of Wood and Its Uses Are Centered. The Building, Erected in 1933, Is the Largest Institution of Its Kind in the World.

FOREST PRODUCTS

THE justification for growing and protecting forest crops is dependent to a large extent on maintaining the consumption of forest products. Forestry is concerned not only with producing timber but with its efficient utilization by satisfied consumers. The foundation of efficient utilization is research in forest products—an integral part of present-day forestry. Its controlling purpose is to insure the permanent place of wood in our modern economy and thus to make lands otherwise idle a source of widespread and permanent employment and wealth.

Profitable and diversified markets for forest crops not only provide incentive and confidence and a sound basis for growing timber by private enterprise, but are of basic importance to National and State forestry developments. The consumption of lumber in 1932 was less than thirty per cent of that twenty years ago. This condition has caused serious unemployment in the industry and liquidation of timber holdings. The Federal Government with its 550 billion board feet of timber on the National Forests and with plans for marked expansion of these holdings has a vital interest in markets for forest products.

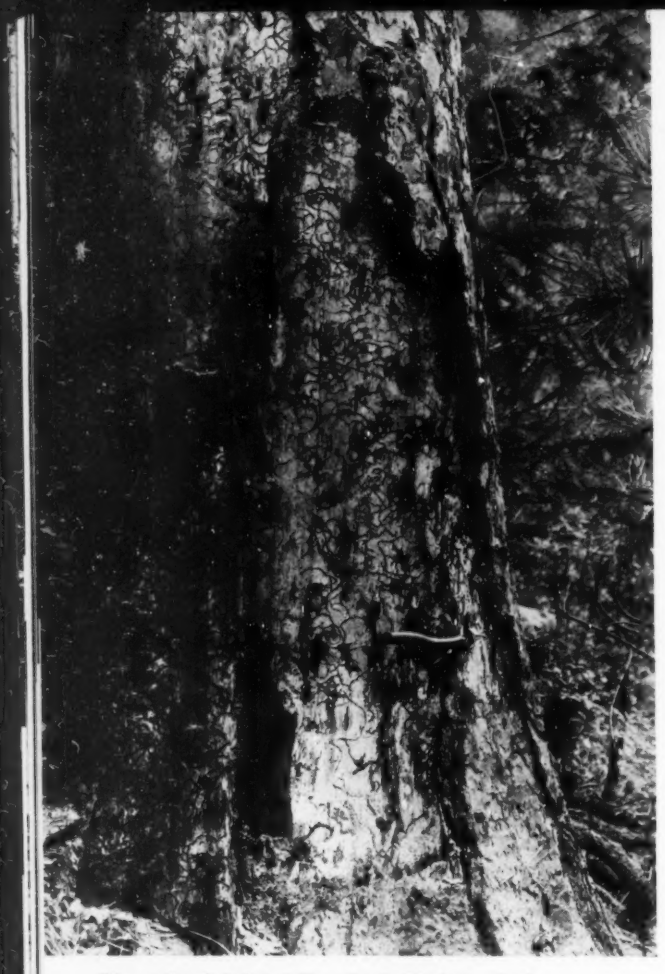
Forest products investigations for the entire United States are largely centered at the Forest Products Laboratory, Madison, Wisconsin. The Laboratory was established in 1910 to take the place of a number of small laboratories scattered about the country and operated by the Federal Government off and on from 1890. It was first established in a private house in Madison pending the completion of a building donated by the University of Wisconsin. The latter building was occupied until 1933, when the present laboratory shown in the photograph was completed.

Facilities of the Laboratory represent an investment of $2,000,000 including the $900,000 building and new special equipment recently procured costing $500,000. The Forest Products Laboratory has become an institution not only of national but of international standing. Its work deals with the several hundred species of woods growing in the United States and with all of the techniques and processes involved in the conversion and distribution of the forest crops into the thousands of wood products used by the American public.

Illustrative of the many problems under investigation are the development of a low-cost prefabricated wood house constructed of readily assembled factory-built units; extension of its work in determining native woods suitable for pulp and paper to offset the increasing importation of such products with attendant annual loss of twenty-one million man-days of work for domestic labor; overcoming the seasoning difficulties which now prevent the utilization of large quantities of hardwoods in the Tennessee Valley and southern region that the Forest Survey has disclosed; the completion of an improved portable band sawmill for the profitable harvesting of forest crops from farm woodlots and scattered small units; and the further development of wood plastics and other lignin and cellulose products to aid reduction of forest and mill wastes.

Small Enemies of the Trees

Organized Warfare Against Insects Is An Essential Part of Forest Conservation



How a Beetle-infested Tree Looks Underneath the Bark Where the Insects Do Their Deadly Work.

MAJOR DESTROYERS

INSECTS are the chief competitors of man for the food supply of the earth. Growers of crop and flowering plants know through bitter experience of the destructive activities of insects but the American public does not generally appreciate the extensive depredation of forest-destroying insects. They rank next to man and forest fire as destroyers of our forests. In most forests, tree insects are always at work, particularly in over-mature and fire-weakened trees. Periodically, owing to unknown factors of weather or environmental conditions, epidemic outbreaks occur and lay waste great areas of valuable trees.

Depredations of tree insects are not of recent origin. They have existed since prehistoric time. Evidences of their work are to be found in fossil trees. The oldest known record left by a bark-eating beetle, except for fossils, is that of the black-horned *Callidium* beetle which fed in the cambium of a California redwood in the early fifth century when Alaric the Goth stood siege before the walls of Rome. The dead beetle was found beneath some 1,500 annual rings of wood growth. Before Jacques Cartier discovered Montreal in 1535, a series of insect depredations began, traces of which have been followed by scars and dwarfed growth-rings in trees during seven major attacks over a period of four centuries.

EARLY SKIRMISHES

MANY of America's epidemics of tree-destroying insects have resulted from the importation of insects from foreign countries.

In 1869 Trouvelot, a French mathematician, came to America to settle at Medford, Massachusetts. In his house he harbored some eggs of the gypsy moth, which he had brought with him in the belief he might cross them to advantage with the silkworm moth. In his absence an enterprising housekeeper swept out the eggs and tiny caterpillars, and a score of years later a gypsy moth epidemic was spreading through New England states. The fight to prevent its spread westward of the Hudson valley is still being waged. It has cost the country millions of dollars. Sometime in the seventies of the past century the larch sawfly was introduced from Europe. It has progressed westward to the Lakes region, destroying millions of board feet of larch timber.

With increasing evidence of damage, there developed gradually an interest in forest insect pests, but it was not until 1890 that A. S. Packard printed the first American report on forest entomology. A. D. Hopkins, the first to take a lifetime interest in the work, spent from 1892 to 1902 at the West Virginia Agricultural Experiment Station. He early recognized that bark beetles are the most destructive forest insects. In 1902 he was made Chief of the new Federal Division of Forest Insects, and in 1906 he pioneered with a control project against the Black Hills beetle.

United States Bureau of Entomology.

Devastation Caused by the Gypsy Moth Which Has Cost the Northeastern States Millions of Dollars and Millions of Trees.

THE MENACE OF EPIDEMICS

EPIDEMIC depredations of tree destroying insects upon both forest and ornamental trees, have done more than anything else to awaken the people to the need of organized protection based upon scientific study and practical measures of control.

Until 1913 forest entomology was learned directly from nature, by men with an absorbing interest in the work. In that year the first organized department for the teaching of forest entomology was established at the New York State College of Forestry, Syracuse University. From that humble beginning sprang a series of formal university courses in forest entomology to train specialists. In spite of the $110,000,000 annual damage caused by various types of forest insects, it was hard for people to realize that insects could kill trees. The gypsy moth, like the chestnut blight, was a great teacher. When caterpillars invaded homes and shade trees were defoliated, there arose a public demand to stamp out the pests. Before the coming of the white man, the "balance of nature" kept forest insects under control but settlement of the country accompanied by widespread forest slashings and fires, and periodic importation of new insects has weakened nature's resistance and multiplied favorable conditions for epidemic outbreaks. Federal agencies cooperating with the States have taken the lead in the battle to halt the drain caused by forest insects. Over $1,000,000 was spent by the Federal Government from 1906 to 1931 in scientific study and control measures.

Ohio Agricultural Experiment Station.

The Airplane is Being Successfully Brought to Bear Upon Defoliating Insects by Quick Distribution of Poisonous Dust Upon the Foliage of the Trees.

BARK BEETLES THE CHIEF FOES

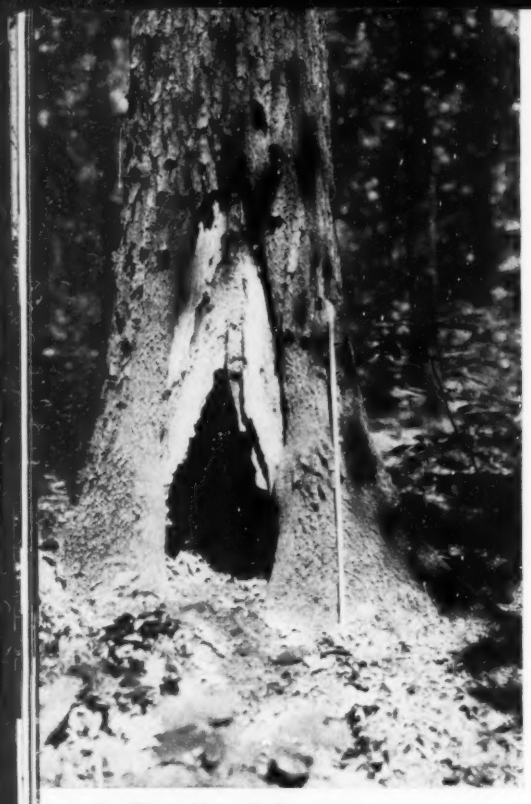
THE bark beetles are the most menacing of all insects in their inroads upon American forests. Periodically, when climatic and other conditions are favorable, they become epidemic and devastate thousands of acres before they are halted by control methods or by natural checks. Thus in southern and central Oregon, within a decade, the western pine beetle destroyed over two billion feet of valuable timber. The total losses from insects to the forests of the United States annually are estimated at one hundred million to one hundred and fifty million dollars in the value of timber alone, not counting the immense dislocation of forest management plans and lumbering operations. The bark beetles are estimated to take an annual toll of five to six billion feet in our western forests alone. Furthermore, the dead forests which they leave behind them are usually fire traps from which fires may sweep into surrounding living forests. The most effective control of bark beetles is to burn infested trees before the insects spread.

The defoliating insects do less damage than the bark-borers, for they merely retard growth of trees whereas bark beetles kill them outright. Conifers, however, sometimes sustain heavy losses from defoliation. Airplane dusting to rid trees of defoliators, first tried in Ohio against the sphinx moth in 1921, has proved successful, but planes are not effective in the majority of forests, which grow on rough land. Parasites of introduced forest insects have been released in infested areas and have often given encouraging results. A subject open for study in the twin fields of forest entomology and pathology is the relationship between insects and the diseases. The European elm *Scolytus* beetle as a carrier of the Dutch elm disease is an instance recently come to public attention.

While great progress has been made by the Department of Agriculture in the knowledge of forest insects, an important task of forest conservation is to organize insect control on a scale comparable to forest fire control.

When Bark Beetles Become Epidemic They May Be As Destructive As Forest Fire. Scene Shows Beetle Killed Timber in Yosemite National Park.

United States Bureau of Entomology.



In Every Natural Forest, Disease Claims a Few Trees Every Year.

Forest Tree Diseases

Complete Forest Protection Calls for Knowledge and Technique in Dealing With Tree Diseases

EARLY STUDIES

TREES, like people, are subject to a great variety of diseases. Every natural forest has its quota of diseased trees, usually those weak in vigor from age, suppression or injury. But diseases of trees, like insects, become epidemic and sweep through whole forests, destroying thousands of trees. In exceptional cases, a virulent disease may threaten to wipe out a species, as in the case of the American chestnut. When the importance of controlling tree maladies entered the consciousness of man is hard to determine. Possibly it was in Europe, when the forests began to wane. Before the close of the eighteenth century papers were published in England on the cure of tree diseases, and New England, first to be threatened with timber losses, borrowed thoughts from abroad on how to preserve trees. It was late in the nineteenth century, however, before much thought was given tree diseases in America. Among the earlier papers of a scientific nature was that of Dr. Beverly T. Galloway in 1896 on "A rust and leaf casting of pine needles." Like Dr. Galloway, one of the pioneer plant pathologists still alive today, a number of pathologists occasionally studied tree diseases. Others made it a hobby. A definite turn toward organized forest pathology occurred between 1900 and 1907 at the Mississippi Valley Laboratory of the Department of Agriculture in St. Louis, under Dr. H. von Schrenk, Dr. George G. Hedgcock and Dr. Perley Spaulding. Though primarily a laboratory for the study of fruit diseases, the work extended into the forest field.

THE CHESTNUT BLIGHT

IN the 1890's there developed in America a fad for Oriental nut trees. Great numbers were brought to America, and with them came the chestnut blight. Its presence was unsuspected until 1904, when Herman W. Merkel, of the New York City Zoological Park, noticed something ailing his chestnut trees. He consulted W. A. Murrill, the mycologist, who described a fungus disease new to America. At about the same time western timber owners became alarmed over tremendous losses due to mistletoes and heart rots. The forests, west and east, were being attacked by diseases. In 1907 a cooperative agreement was signed between the United States Forest Service and the Bureau of Plant Industry to form an Office of Investigations in Forest Pathology. The chestnut blight was then attacked with new vigor in a far-flung cooperative effort participated in by Pennsylvania, New York, Massachusetts, Connecticut, New Jersey, Virginia, West Virginia, and North Carolina. That was the beginning of organized forest pathology in the states. But the blight spread rapidly. Control of the incipient infestation had been too long delayed and America's knowledge of the disease and how to cope with it was inadequate. After spending millions of dollars, the fight was abandoned as economically unjustified and attention turned to the Orient to find blight-resistant species to replace the doomed American chestnut. Today experimental plantations of exotic chestnut trees stretch from New England nearly to the Gulf, but results thus far have not justified announcement of the finding of a substitute.

But Outbreaks of Virulent Diseases May Wipe Out a Species Completely—A Veteran Chestnut Slowly Dying From the Blight

Bureau of Blister Rust Control

CCC Boys Fighting the White Pine Blister Rust With Poisonous Sprays That Kill Its Intermediate Hosts of Wild Currants and Gooseberries.

THE WHITE PINE THREAT

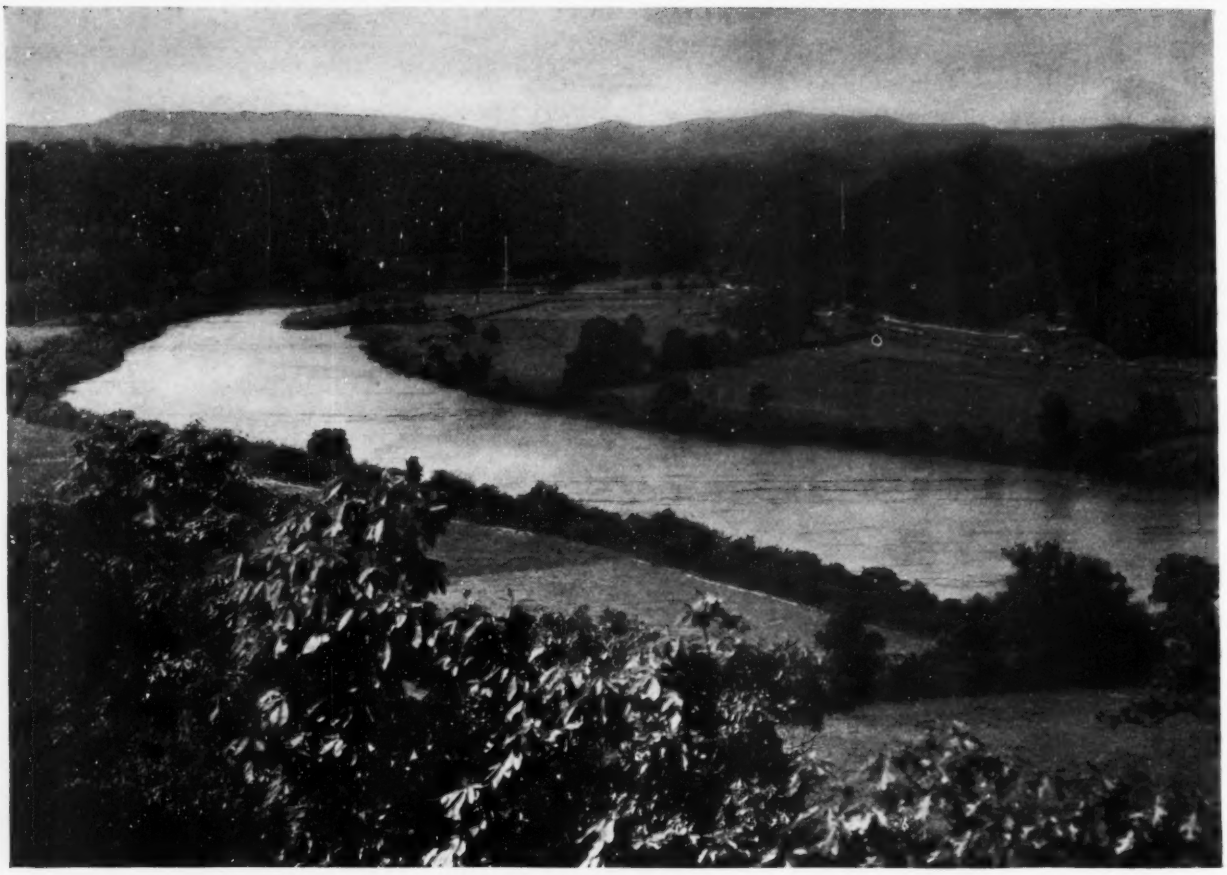
ANOTHER Oriental menace, the white pine blister rust, had meantime slipped into Maine on seedlings grown in Germany from American seeds as early as 1897, but it was not discovered until 1905, in a nursery near Philadelphia. The fight against tree diseases was shifted to blister rust when control of the chestnut blight was abandoned. The Federal Government and affected states turned their scientists to the new problem, but in most states forest pathology as such fell into decline. The blister rust showed itself more amenable to control than chestnut blight because of its dependence on gooseberries and currants as intermediate hosts, removal of which checked the disease. For almost twenty years, the fight to control the blister rust has been going forward. Estimated expenditures to date total almost $20,000,000.

The damage done to trees by diseases is beyond calculation. The estimated cull due solely to decay in standing saw timber in the United States is fourteen per cent. This does not take into account the ravages of mistletoe, the tremendous losses due to introduced diseases, nor any of the other threats such as willow blight, beech bark fungus, and resinosis of northern white and Norway pine. The Federal Government, during the past five years, has spent an average of about $1,500,000 annually for research and control of forest tree diseases, and is practically alone in its efforts to halt the tremendous losses. Aside from their efforts to control blister rust, none of the States have organized full-time forest pathology departments.

THE LESSON OF EXPERIENCE

IN 1919 an introduced fungus, probably from Asia, appeared in Holland and began to take its toll of the native elms. From there it swept over Europe, killing thousands of valuable and beautiful elms. In 1930 it was discovered in America, first in Ohio and shortly afterward in New Jersey, New York and Connecticut. The disease came to this country in elm logs arriving at Norfolk and Baltimore from France. An intensive eradication drive is now in progress. Information and funds were the crying need to combat the Dutch elm disease. Original funds were inadequate and delayed control work but recently $2,500,000 was allotted from Emergency Relief Funds to carry on the fight. Blister rust and elm disease were both known about before they came to America, but they were not studied abroad by American pathologists until after both diseases had gained momentum in this country. The experiences with these diseases and with the chestnut blight clearly emphasized that protection of American forests will not be assured until the Federal Government and the States are adequately organized and equipped both by scientific knowledge and methods of control to eradicate outbreaks of tree diseases in their incipient stages. Otherwise every epidemic will be a costly lesson to the American people.

Workers Removing An Elm Infested With the Dutch Elm Disease—Latest Threat to America's Trees.



A Scene in the Cherokee National Forest, Tennessee, Where Forested Slopes Give Harmonious Adjustment to Erosive Forces and the Contour of the Land.

PROBLEMS OF WATER

LAND AND WATER

WATER is essential to all life, both of man and of other animals and of vegetation. Man appropriates water from streams, lakes, ponds, and the soil, for domestic requirements, livestock, production of crops, including forage and forests, and for a variety of industrial and other services. The problem of water in human life and activities involves, first, provision for adequate and dependable supplies; second, control of streams and surface run-off on the land, to prevent floods and soil erosion; third, removal by drainage of excess waters on valuable land; and, fourth, prevention of wastage in use. The great natural forces affecting precipitation in the form of rain or snow are for the most part beyond control of man. The manner of distribution of water in streams and on land can be controlled through engineering works, skillful use of vegetative cover on the land, and economy in use. From the standpoint of planning for a maximum use of waters to meet public needs, the services of water include: domestic supplies, disposal of waste, fire protection, use in agriculture and stock-raising, use in industry, production of hydro-power, navigation, recreation, maintenance of fisheries, and conservation of wildlife.

Problems of water use and control are intimately interwoven with the use and abuse of land. Water is the chief force of erosion which is responsible for the fashioning of valleys, stream channels, and other familiar land patterns. Nature tends to clothe the land with vegetation, greatly retarding the movement of soil on slopes. Forests, brush, grass, and other plants anchor the soil with their myriad roots, and in various ways lessen the velocity and quantity of water flowing over the land surface, thereby retarding soil erosion.

Stability of land reacts on streamflow. Inevitably streams fluctuate with the amount and character of rainfall and the manner of melting snow. Where land conditions are relatively stable there is a maximum regularity of streamflow, and the extremes of high and low water are moderated. Streams are supplied chiefly by water running off from the surface of the land and from that seeping through the soil. The behavior of streams is governed not only by topography and physical character of soil, but also by the character and condition of the vegetative cover. Abuse of land which accelerates erosion, increases surface run-off, and decreases underground seepage, may powerfully influence the problems of water conservation and control.

FORESTS AND STREAMS

FORESTS directly affect the flow of streams by lessening the quantity and velocity of water moving over the surface of slopes. A portion of the falling rain is intercepted by crowns of the trees and evaporated before reaching the ground. The trees, shrubs and other plants and litter on the ground act as a mechanical check on the rapidity of run-off. The ground litter and humus absorb and hold considerable quantities of water. The forest soil, under the influence of the litter and decomposing humus, is maintained in a favorable condition for absorption and infiltration of water. Of special importance is the protective influence of forests in checking soil erosion on slopes. Erosion in all its forms accelerates the velocity of surface flow of water and lessons the amount entering the soil. The discharge of silt into streams, canals, and reservoirs is reduced to a minimum where there is a good forest cover on the tributary slopes. Forests retard the melting of snow in the spring, ordinarily discharging water to streams less rapidly than on open land. Unseasonable thaws may, however, counteract this favorable influence. The general effect of a good forest cover on the slopes of drainage areas is to moderate freshets and ordinary floods, maintain springs, and, by increasing the relative quantity of water seeping through the soil, contribute to the regularity of summer streamflow. The influence of forests is less marked in case of major floods on large rivers, when the soil, litter, and humus in the forest becomes so saturated by excessive rainfall that the retarding influence on run-off is lessened. Nevertheless every factor, such as a favorable condition of forests and other vegetation on the slopes of tributary drainage basins, contributes to river control.

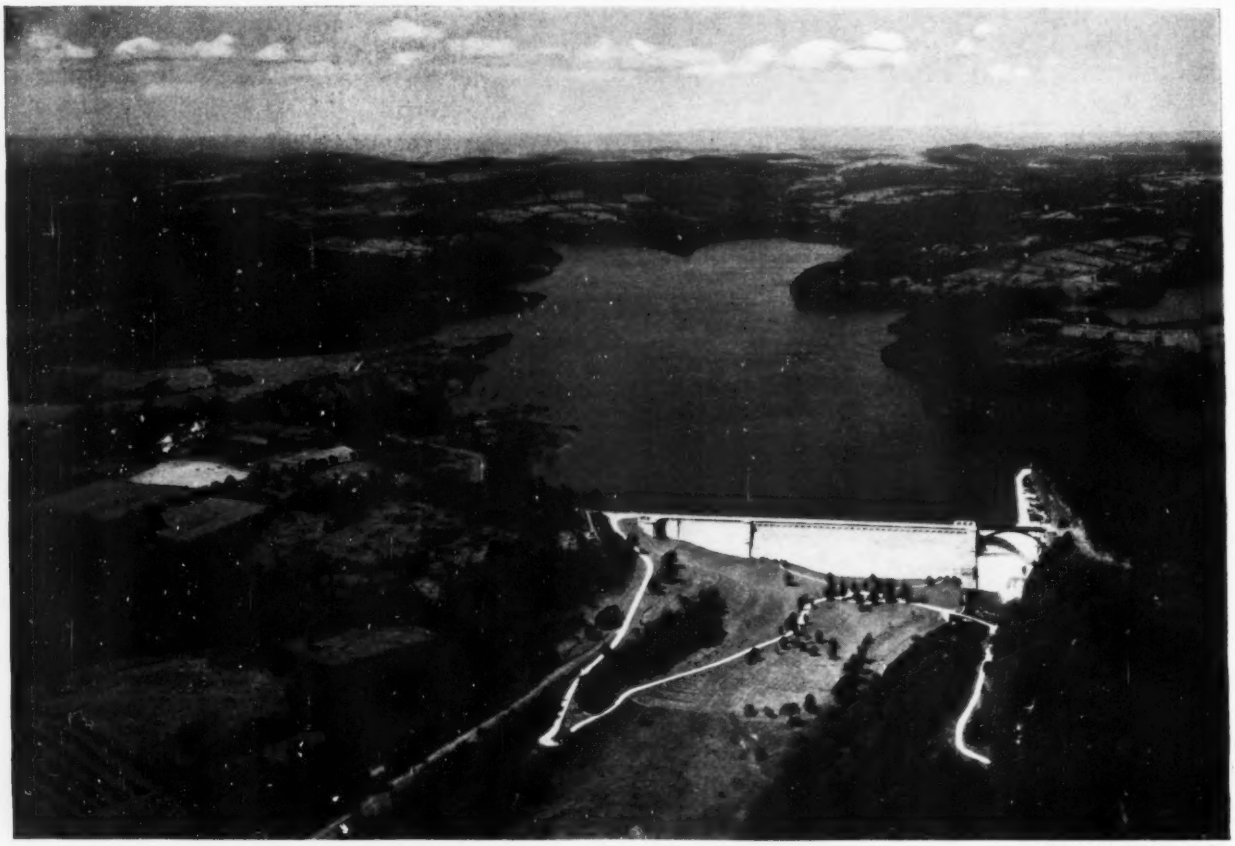
Fred H. Kiser

Forests Not Only Check the Run-off of Falling Rain But "Their Roots Are the Nurses of Rivers in Birth."

Work of a Mountain Stream That Destroyed 400 Homes in La Crescenta, California, in 1934.

FLOODS

STREAMS tend to establish channels adequate to carry the volume of water discharged into them in normal years. Prolonged and heavy rains and rapidly melting snow may swell a given stream beyond the capacity of its channel, causing an overflow, accompanied by extensive damage to property and even loss of life. Rapid rise of water on headwater streams creates torrents that often wreck buildings, bridges, and highways, and deposits gravel in fields and even in streets of towns. The control of headwater streams to prevent local floods and to mitigate the influence of high waters on floods in the lower sections of rivers has not been undertaken in a planwise way. One of the purposes of establishing a large system of public forests is to secure a maximum service in regularizing the run-off and thus moderate the extremes in streamflow.



Fairchild Aerial Surveys, Inc.

Air View of One of New York City's Storage Reservoirs With Wooded Shores. Crotan Dam in the Foreground.

STORAGE OF WATER

THE most important of all water problems is provision for safe drinking water. It is a basic feature of public health. In the pioneer days all household water was obtained from wells, springs, streams, or ponds. Concentration of population in large communities necessitated centralized supplies not only for domestic use, but also for fire protection and for service to industries. A large part of the farm population still relies upon wells or nearby streams for home supplies. About sixty-five per cent of the population is served from water works either owned by the public or by utility companies.

Some cities and private water agencies maintain well managed forests on the drainage areas of their reservoirs, to check siltage from erosion and to secure a maximum of pure water from soil seepage. In some cases cities pipe their water supplies from great distances. New York secures some of its water from sources 125 miles away. Water for Los Angeles is piped 150 miles, and that district proposes to obtain supplies from the Colorado River at a distance of 280 miles.

Contrary to a popular impression, the problem of domestic water supplies is not confined to the West. In many portions of the humid East the problem of adequate water for community use is becoming increasingly difficult as increasing populations create new and larger demands for water.

Even with the best conditions of forests or other vegetation on slopes, a dependable supply of water for domestic and other purposes ordinarily cannot be obtained from unimproved rivers at all seasons. Great quantities of water are carried to the sea in high water seasons without use, and frequently there is a deficiency during dry months. Reservoirs are built at strategic points to store the excess waters flowing in the periods of ample precipitation, to be drawn upon during low water seasons. Storage reservoirs may be constructed to supply water for domestic use, fire protection, and needs of factories, for disposal or dilution of sewage and industrial wastes discharged into streams, for irrigation, generation of power, improvement of navigation, flood control, recreation, or wildlife conservation.

In many instances a reservoir may provide several of the foregoing services. In other instances there are conflicts in use that can be reconciled only by special design of the dam. Thus a reservoir whose only purpose is to maintain summer flow of a stream is not suited for flood control. In the development of a river various possible services must be anticipated and provision made in the design of the works to secure a maximum multiple service from the reservoir.

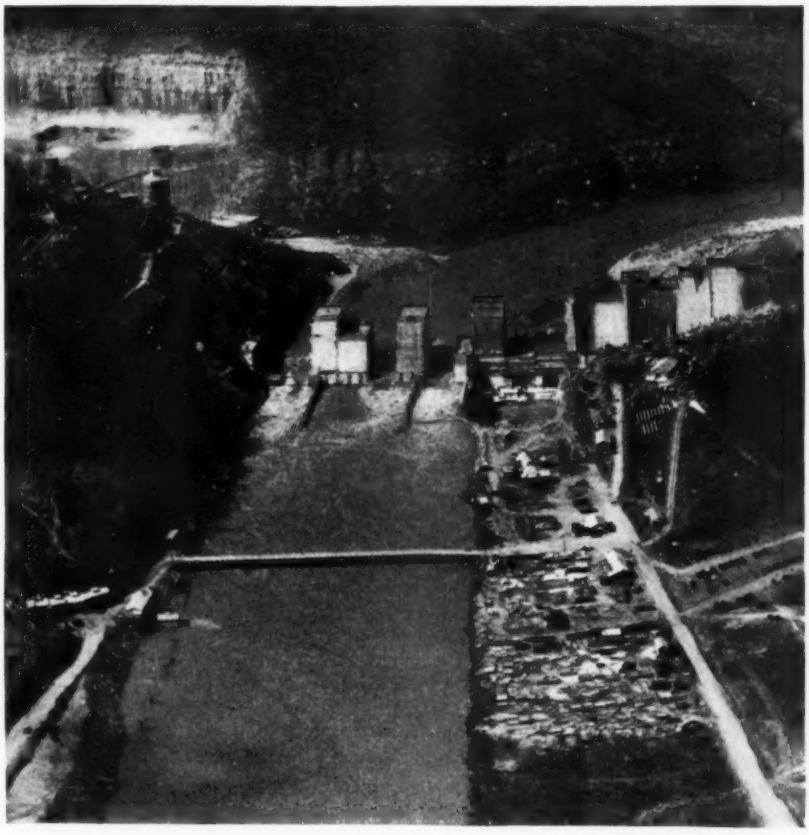
WATER AND AGRICULTURE

IRRIGATION, supplies of water for household use and for stock, and drainage, constitute major water problems of the farmer and stockman. Early settlers secured water for irrigating their small fields by simple diversion works from nearby streams. There has now been developed a great system of reclamation of dry land by supplying water from reservoirs operated by public, cooperative, and private agencies. In regions within the transitional zone between humid and semi-arid climates irrigation is required during a part of each year or in some years and not in others. Nearly nineteen million acres in the West are under irrigation, of which about sixteen million acres receive water from surface sources and the balance from underground waters or a combination of the two sources. Irrigation is increasingly used by farmers in the East during dry seasons. Adequate supply of water for domestic use and for livestock is one of vital importance on farms, particularly where underground waters or streams with irregular flow are relied on. During the recent great drought ordinary wells were lowered in some portions of the West from ten to thirty feet. In some sections artesian waters have already shown signs of depletion, calling for sharp economies to check prevalent wastage in use. Provision for stock watering places on the range also presents a serious problem.

The Yakima Project, Washington, Illustrates How in the West Water Is Carried Long Distances to Reclaim Arid Regions.

PUBLIC ASPECTS

WATER conservation is preeminently a public problem. Water is a public necessity, requiring development by common effort and public control in distribution and use. Private and cooperative enterprise cannot be relied upon to meet many of the needs of the public. The trend is toward public ownership of municipal supplies; and private water companies are under public control. Manufacturing plants and mines discharge waste which together with sewage and effluents of sewage plants have polluted streams, depleted or destroyed fish life, jeopardized public health and interfered with recreational use of the waters. Correction of these conditions calls for a greater degree of public regulation and large public expenditures for storage reservoirs and other works. The cost of additional supplies of water for irrigation is beyond the means of private concerns and communities and requires aid from states or the central Government. Aside from the control of appropriation of water, as exercised by western states, the Government controls the use of power sites on Federally owned land and development of power on navigable streams. And the public will increasingly participate in the development of hydro-power in connection with such great works as are under way on the Columbia, Colorado, and Tennessee rivers. The improvement of rivers for navigation has always been a Federal function. Flood control has been demonstrated to be possible only through public expenditures.



Air View of Norris Dam, Tennessee Valley, in Course of Construction, Which Typifies Increasing Participation by the Public in the Development of Hydro-electric Power.

Wide World Photos

To Safeguard Human Life, Millions of Gallons of Water Had to Be Shipped into Drought Stricken Regions in 1934. View Shows Water Shortage in Imperial Valley, California.

SOCIAL-ECONOMIC PROBLEMS

THE purpose of public efforts in water conservation and control is to safeguard life, public health, and property, advance industrial development, and improve living conditions in all aspects. The determining factors in the improvement of a river system are not confined to problems of engineering works. These are vitally important but there must be considered at the same time the social-economic services that may be rendered as justification for the large financial outlays involved. Great river works should constitute a system of improvements that will be permanent in character and will serve not only the present but future generations. In the past it has far too often been customary to measure economic feasibility of water improvements in terms of dollars only. Thus the economic values of flood control works have been determined on the basis of average measurable property damage resulting from floods during a period of preceding years.

There are many intangible values that should be included in determining economic feasibility, such as security of life, possibility of epidemic disease, prevention of distress, interruption of transportation and business; restricting, through fear of floods, of expansion of population, development of resources and industrial advance, and indirect national effects of lessened earning power of a region. In navigation projects the question is not only whether present and immediate traffic will justify the cost, but also whether channel improvements will contribute in development of resources and of industries that will enlarge opportunities for prosperous livelihood for the people of the region. Analogous questions arise in considering storage reservoirs, for domestic supplies, irrigation, lessening impurities in streams, hydro-power, and recreation. The possibilities of social-economic development on the land and in communities in a region are therefore of vital importance in determining the extent and character of water improvements that may contribute to such development.

NATIONAL PLANNING

PROJECTS for the development of waters usually have been designed to meet the needs of specific local interests, without reference to regional and national needs. A maximum service of existing water resources and the reduction of losses by floods and water scarcity can only be achieved through systematic planning by public agencies and under the leadership of the Federal Government. Theodore Roosevelt, in 1907, emphasized the need of considering the Mississippi and other river systems as a whole in progressive development by engineering works, and urged the necessity of correlating with water improvements the conservation of forests and other land resources. A similar objective was set forth in the National Industrial Recovery Act, which provided for comprehensive planning for flood control and water conservation. Work has already been initiated in such comprehensive planning, building on the extensive surveys of the Corps of Engineers and other Government bureaus and the work of some of the states. Initial reports have been issued by the Mississippi Valley Committee and the National Resources Board. These studies indicate the need of large-scale planning, not only in improvements on rivers and streams but also in development and control of ground waters, proper systems of drainage, restoration of water on areas unwisely drained, use of existing lakes and ponds, reduction of pollution, and control of run-off of water on land to check erosion. The investigations emphasize, further, the vital necessity of coordinating plans of water conservation and control with those of forestry, soil erosion, and land use generally. It is clear that the Federal Government should take the lead in planning, because of the interstate character of many of the problems and the direct interest of the Government in many problems such as navigation, flood control, irrigation, and hydro-power. National leadership does not imply that the planning or the cost of public works should be carried wholly by the Government. Some projects are clearly national in character even under the present interpretation of law. In others the Nation may appropriately make grants in aid. The work of planning should be a joint enterprise, the Federal Government assuming the guidance, with close cooperation with state and local agencies.

Another View of the Yakima Project Which Illustrates How the Conservation of Water in the Mountains and Its Planned Use May Transform Barren Regions into Prosperous Communities.

CONSERVATION

United States Forest Service

An Adirondack Example of How Nature Protects the Land Against Erosion by Bringing Into Play a Protective Cover of Vegetation.

NORMAL EROSION

THROUGHOUT the ages, the surface of the earth has undergone a constant change. Natural geological action, in a timeless process of weathering, wearing and transporting rock and soil material, has raised the towering mountain peaks and levelled the broad valleys that we know today. This ageless phenomena of imperceptible change is known as normal geological erosion.

With the development of civilization, another type of erosion evolved and grew into tremendous proportions. This was "man-made," or accelerated erosion, which can be traced directly to unwise land use and man's need for the produce of the soil. It follows rapidly wherever nature's protective mantle of trees and grasses is removed to make way for vast areas of cultivated fields and far flung pasture lands.

The alarming feature of "man-made" erosion is the swiftness with which it spreads to take an ever increasing toll of land resources. Active in varying degrees of intensity from Maine to California and from Canada to the Gulf of Mexico, it presents a menace to American agriculture which must be met by quick and decisive scientific measures. Already it is costing the country more than $400,000,000 annually in lost productivity alone.

This accelerated erosion is divided into three categories: sheet erosion, gully, and wind erosion.

SHEET EROSION

SHEET erosion is the most prevalent and destructive of all forms of "man-made" erosion and consists of the gradual washing away of a thin layer of top soil over an entire area by the rapid run-off of rain water. According to surveys and estimates, approximately forty-five per cent of the area of the United States, exclusive of large cities and water, has been affected in some degree by this form of erosion.

It presents a three-fold problem because it may affect an entire farm without concentration at any particular spot, and therefore remain unnoticed for a long time; because it relentlessly removes a thin sheet of top soil with every heavy rain falling on unprotected slopes, and because it often leads to formation of gullies. Nevertheless, if recognized in its initial stages, it can be controlled by practical and inexpensive conservation measures.

Steep hillsides should be retired from crop production and restored to trees and grasses. Gently sloping land may be protected by a combination of strip-cropping, which embodies planting of soil-conserving crops such as alfalfa or clover, between strips of clean-tilled crops such as corn and cotton; contour tillage; crop rotation and scientifically constructed terraces, which conserve moisture.

Once Nature's Processes Are Ignored, Sheet Erosion As Shown Here in California, May Quickly Rob the Land of Its Fertile Top Soil.

OF THE SOIL

GULLY EROSION

WHEN water is allowed to run off sloping land in an uncontrolled, concentrated flow, the result is usually gully erosion. Tiny rills cutting through unprotected top soil grow into small gullies, and these, with mushroom-like rapidity, expand to form deeper, broader gullies destructive to farming land. In the United States it is estimated that approximately 864,000,000 acres have been affected by gullies.

The immediate objective in gully control work is not to reclaim the gully, but to stabilize its growth, prevent its encroachment into adjacent lands and keep it from delivering a load of sediment to streams and bottom lands. This constitutes a genuine problem, since it involves the necessity of treating the conditions causing the gully as well as the gully itself.

The first step in gully control is to eliminate as far as possible the flow of water into the gully. The second step concerns the gully itself. By judicious use of vegetation, including trees, grasses, vines or shrubs, eventual stabilization of a gully becomes possible; although it is usually necessary to employ one or several of the various types of inexpensive check dams built of wire brush, sod, rock, timber or other readily available materials that meet the requirements of the particular area and gully.

Some of the 800,000,000 Acres of Land in the United States Which Gully Erosion Has Claimed and Made a National Menace.

WIND EROSION

EVER since the first spectacular dust clouds soared out of the Middle West two years ago, dust storms have become, in the popular conception, the symbol of all erosion. These dust storms, however, comprise only the advanced stages of wind erosion. Behind them stand years of unwise land use, with an attendant loss of moisture and soil-binding material.

Wind erosion, by definition, is soil blowing induced by the removal of soil-anchoring vegetation. More prevalent during the past few years than ever before because of drought, wind erosion has affected in some degree approximately sixty million acres in the United States.

Halted temporarily by the heavy rains of May and June, the dust storms will recur again and again with increasing frequency unless common sense methods of land use and control are placed in operation. Treatment must provide a long-time cropping or land-use program in order to avoid conditions that will lead to dust storms in the future. Whether acting to prevent wind erosion of the future or attempting to conserve the fertility of areas already affected, the primary objective is the same—moisture conservation and soil anchorage through judicious planting of crops, and breaking the sweep of wind through correct tillage measures and tree planting.

This Kansas Dust Storm of 1935, Dramatic Symbol of Wind Erosion, Robbed the Farmers of Thousands of Tons of Fertile Top Soil.

Courtesy Soil Conservation Service

Soil Conservation Service

Part of an Area of 10,000 Acres in South Carolina Where Erosion Has Left a Trail of Abandoned Homes.

PUBLIC AWAKENING

ALTHOUGH the destructive effects of soil erosion were recognized even in Colonial days by such leaders as George Washington and Thomas Jefferson, it was not until thirty years ago that a beginning was made on our present-day program of soil conservation. At that time, H. H. Bennett, then a young chemist in the Department of Agriculture's Bureau of Soils, became aware of an active relationship between land poverty and soil erosion. Studying this relationship, he became firmly convinced that the problem of erosion outstripped every other problem or combination of problems relating to soil decline.

Since then the interest of the Government in a soil conservation program has grown steadily. In 1933 the Soil Erosion Service was created as an emergency agency in the Department of the Interior to carry out an actual erosion control program. Bennett was named Chief. Recently the Service was transferred to the Department of Agriculture, renamed the "Soil Conservation Service" and given permanent status as a governmental agency. Already it has set up a nation-wide network of demonstration projects to show farmers how to halt erosion. With $25,000,000 for program expansion, there will be more than one hundred of these projects in operation in the near future.

THE CONSEQUENCES

ACROSS the American continent we have written a record of land wastefulness never equalled in the history of the world.

Soil erosion by rain and wind has literally destroyed fifty million acres of land that a little while ago was in productive cultivation. Another fifty million acres is in almost the same condition, stripped of fertile surface soil, ripped and scarred by gullies. And nearly one hundred million acres more, still in cultivation, has been so seriously impoverished that the production of crops on a profitable basis is virtually impossible.

The consequences attendant upon this impoverishment and destruction of formerly productive land cannot be measured solely in terms of the land itself. Soil washed from hillside fields is clogging reservoirs and stream channels, menacing our irrigation systems, inflicting tremendous injury upon our fish and game resources. Rich bottom lands are being buried by non-productive sand and subsoil clay swept down from adjacent slopes.

Of even more importance are the human values involved. Abandoned acres mean abandoned homes, and we are wearing out land at the alarming rate of more than 200,000 acres a year. Agricultural communities dependent upon the soil deteriorate as the productiveness of the soil disappears.

An Experimental Project in Missouri, Conducted by the Soil Conservation Service, to Determine Soil and Water Losses Under Different Methods of Land Cropping.

Soil Conservation Service

METHODS OF CONTROL

No single unsupported measure of prevention provides effective erosion control. It is necessary to use many methods, both mechanical and vegetative, integrated and synchronized into a complete plan of wise land use. On watershed areas selected for demonstration purposes, each individual parcel of land is treated in accordance with its peculiar needs and adaptabilities. Some of the fundamental measures include strip-cropping, terracing, reforestation, contour tillage and crop rotation, though this is by no means the entire portfolio of erosion control. On some land, particularly that which is submarginal or too steep for profitable cultivation, the only possible method of controlling erosion lies in retiring it from cultivation and planting it to trees and grasses.

To do this work scientifically, each demonstration project is staffed with specialists, including agronomists, foresters, agricultural engineers; specialists in soils, farm and range management experts and finally a new technician developed by the Soil Conservation Service itself—the erosion specialist. The efforts of all these experts are combined in a well-balanced, comprehensive program of wise land utilization. In sixty-six nurseries under direction of the Service, trees and grasses suited to erosion control are being produced. And with an eye to the future, twelve erosion experiment stations are conducting research work designed to make erosion control methods more permanent, inexpensive and effective.

International Harvester Company

A Demonstration Project in California Where Terracing Is Being Employed to Save Farm Lands From the Inroads of Gully Erosion.

An Example in West Virginia of the New Concept of Hill Land Agriculture. Here the Best Use Is Made of Nature's Laws in Controlling Erosion.

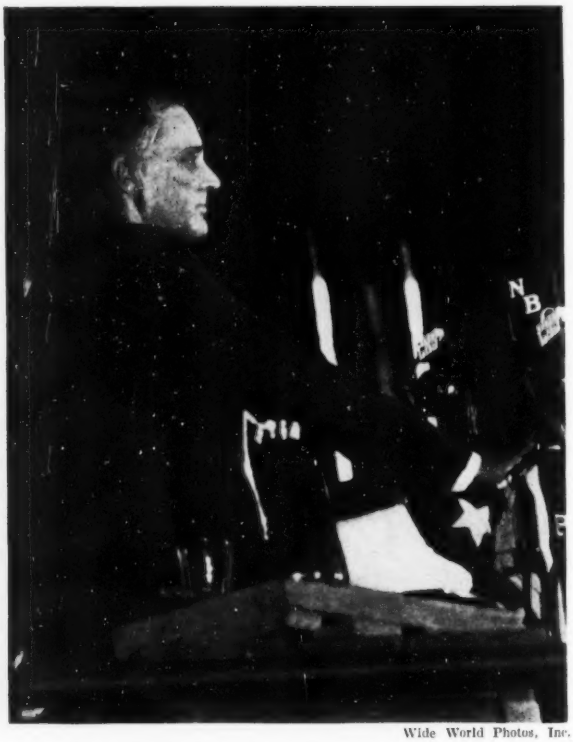
Soil Conservation Service

THE NEW CONCEPT

THROUGH the soil conservation program, a new concept of the soil is being created in the mind of American agriculture. The old era of farming for production's sake is being transformed into a new era of husbandry. Slowly but surely the day of soil exploitation is passing and in its stead is arising a genuine interest in soil conservation.

In this transformation the Soil Conservation Service is playing a leading role, for not only has it been officially designated to coordinate the soil conservation forces of the country but it has become the leader in a new field of thought and action and the epitome of a new era in the treatment of that basic natural resource upon which the welfare, not only of our agriculture, but of all the people, so surely depends.

Protection of the soil, the Service insists, is fundamentally a matter of land use; and accordingly all the factors involved in the use of the land as based upon its physical adaptabilities, have been woven into the program for demonstration to the nation's farmers. Science has provided and is continuing to provide the essential data necessary for wise land use through which may be brought about a transition from the pioneer psychology which bred land exploitation to a new era of thoughtful conservation which will preserve our soil resources for future generations.



Wide World Photos, Inc.

In Accepting the Democratic Nomination for President at Chicago, Franklin D. Roosevelt Said: "With a Definite Land Project, Employment Can Be Given to a Million Men."

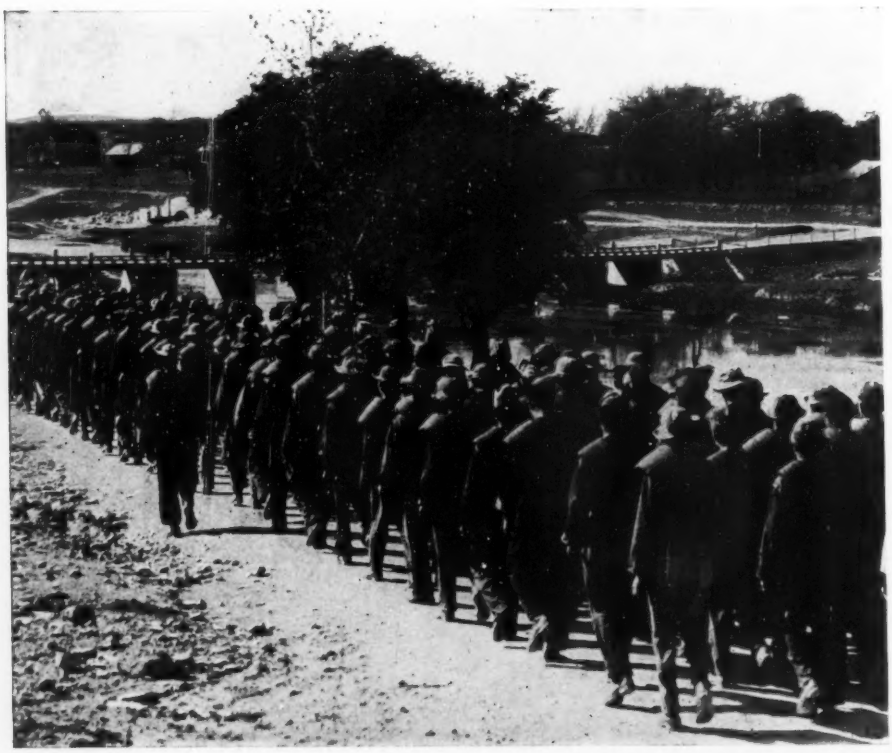
THE CIVILIAN CONSERVATION CORPS

THE spring of 1932 saw the nation at grips with the depression. Millions condemned to idleness struggled desperately with poverty.

In the forefront of this struggle were thousands of unemployed young men, destined by a situation over which they had no control to the blighted life of the street corner, the open road and the "jungle" camp. By June their number had increased to a million and their ranks swept over the nation in an endless tide.

Then, at Chicago, on July 2, Franklin D. Roosevelt, in accepting the Democratic nomination for President, revealed a plan taking shape in his mind to help relieve distress among the unemployed through a great public works project of forest and land restoration. "With a definite land project," Mr. Roosevelt said, "employment can be given to a million men."

On March 21, 1933, just seventeen days after his inauguration, the President sent a message to Congress urging legislation to carry out the plan. On March 31, Congress passed the Emergency Conservation Act giving authority to the President to establish a chain of forest camps where young men, between the ages of eighteen and twenty-five, whose lives were being undermined by idleness and whose parents or dependents were likewise in need, could engage in different forms of forest and land improvement work. Thus came into being the Civilian Conservation Corps.



During May and June of 1933 the Nation Witnessed the Most Rapid Mobilization of Men in the Country's History. Two Hundred and Fifty Thousand Young Men Were Enrolled and Moved to Army Conditioning Camps to Prepare for Work in the Forests.

WORK BEGINS

"I WANT the work to begin in two weeks," the President said when he signed the bill. Five days later, on April 5, Robert Fechner, of Boston, was named Director of Emergency Conservation Work, with an Advisory Council of representatives from the four government departments selected to carry out the project—the Departments of Labor, War, Agriculture and Interior. During the weeks that followed the nation witnessed the most rapid mobilization of men in the country's history, exceeding even that during the World War. The Labor Department enrolled 250,000 unemployed young men and the Army moved them to concentration points where they were prepared for the work that was ahead of them in the nation's forests.

THE first forest camp was established on April 17 in the George Washington National Forest, near Luray, Virginia. As Camp No. 1, it was given the name "Camp Roosevelt." By July 1, 265,000 men, including 15,000 Indians, were in 1,500 camps. Later, 25,000 war veterans were added. Rates of pay were set at $30 a month for each man with slightly higher rates for those selected as leaders. Enrollments were approved subject to each man sending home monthly $25 of his pay.

The First Forest Camp Was Established on April 17, 1933, Near Luray, Virginia.

THE CORPS IN FULL SWING

MORE than sixty different activities, each contributing to the rebuilding and protection of the natural resources of the nation, awaited the Civilian Conservation Corps in National Forests, National Parks, State Forests and Parks, and other public lands and waters. These activities were planned and directed by the Departments of Agriculture and Interior and by the various state conservation agencies. More than 16,000 technical foresters, construction foremen and supervisors were employed to supervise the work.

By August, work was in full swing in all sections of the country. Practically every community was beginning to feel the many benefits of the Corps. Fears in some quarters that such a gigantic undertaking, having no precedent to guide it, would result in failure soon vanished. At the expiration of the first two year period on March 31, 1935, so marked were the benefits to the men themselves in restoring health and morale, so widespread was the effect of the work they were doing, that the President announced a two year extension of the Corps and an increase in its strength to 600,000, for which Congress authorized $600,000,000. During the first two year term more than 1,000,000 men saw service in the Civilian Conservation Corps.

Building a Fire Protection Road on the Nicolet National Forest, in Wisconsin.

Stopping Erosion with Check Dams. Below—On the Fire Line.

CORPS ACTIVITIES

THE great bulk of Corps activities was being directed toward the protection of the vast forest areas of the country from fire and tree-attacking diseases and insects, soil erosion control and the improvement of areas for recreational use.

Protection against forest fire was the chief activity. In two years 48,000 miles of new truck trails and roadways—nearly twice the distance around the earth—were constructed for the quick movement of fire fighting units. More than 76,000 miles of old trails and roadways were improved. Fire-breaks, useful in preventing the spread of fire, totalled 35,000 miles; fire hazards such as highly inflammable dead trees and underbrush were removed from 1,038,000 acres. More than 43,000 miles of new telephone line to connect fire look-out stations with points of mobilization of fire-fighting units were strung, 30,000 miles improved. Roadside and trailside clean-up for fire prevention amounted to 28,000 miles.

Next in importance to fire prevention and protection was soil conservation work. This activity, designed to check the process of soil erosion and to restore to productivity millions of acres of worthless land, covered 1,916,000 acres. More than 1,400,000 erosion control check dams were constructed.

FIRE FIGHTERS AND TREE PLANTERS

BUILDING truck trails and roads, constructing fire-breaks, stringing telephone lines and removing fire hazards were not the only contributions of the Civilian Conservation Corps to fire suppression and prevention in the forests and parks of the country. During the first two year period members of the Corps devoted 1,700,000 man-days to the actual fighting of forest fires. On practically every major fire line during the late summer of 1933 and the entire fire season of 1934, young men accustomed to the environment of great cities stood shoulder to shoulder with trained and experienced fire fighters, often giving exhibitions of courage, judgment and physical stamina that personified more than anything else the new spirit that had come to America's disillusioned youth through the medium of the Civilian Conservation Corps.

Practically 267,000,000 trees have been planted by the C.C.C. on the denuded public lands of the nation. Hundreds of thousands of pounds of tree seed have been collected, nurseries have been established for the growing of young trees. Forest stand improvement work has been completed on 1,644,000 acres. Public camp-ground facilities, water systems, buildings, bridges and dams have been developed for recreational use in forests and parks. Thousands of reservoirs have been built on the public lands for wildlife and livestock; ponds have been constructed for fish and birds, streams have been restocked with fish.

In the fields of flood control, irrigation and drainage important surveys have been made, dams and levees constructed, river and stream banks cleared and protected, drainage ditches developed.

VALUE OF WORK

EXTENSIVE campaigns have been carried on against tree-attacking diseases and insects, such as the white pine blister rust and gipsy moth. Tree and plant disease control work has been conducted on nearly 4,000,000 acres, while an equal area has been covered in the fight against insects. Intensive work on destructive rodent control has been conducted on 11,000,000 acres.

The results of these major activities during the first two year period, and of many other work projects too numerous to mention, have definitely placed the country in a position to better manage and protect its natural resources. The value of the work accomplished under the program is estimated to exceed $400,000,000, not taking into consideration the gradual increase in values which will occur on many of the projects and the great savings to the nation which will result from better protection against fire, floods and soil destruction.

Eradicating the White Pine Blister Rust in the Pacific Northwest. Extensive Campaigns Have Also Been Carried on Against Tree-attacking Insects and Destructive Rodents.

THE EDUCATIONAL PROGRAM

EDUCATIONAL, welfare and recreational activities have played an important part in the Civilian Conservation Corps' task of rebuilding men and forests. Not only was it necessary to restore in most of the young men a sense of self-development, but it was essential that they be mentally and physically prepared for their work and for their future endeavors.

On December 30, 1933, a general system of education was adopted by the Army, with the Office of Education of the Department of the Interior serving in an advisory capacity, featuring a unified, informal program to fit the needs, capabilities and desires of the enrolled members. Educational advisors, drawn from the ranks of unemployed school teachers, were placed in each of the camps to develop the programs. All classes were conducted on a voluntary basis, and included vocational subjects as well as all phases of conservation. At the end of the first two year period, nearly fifty-four per cent of the enrolled members were participating.

Preparing for the Future—a Civilian Conservation Corps Classroom.

YOUTH WELFARE

THE effects of outdoor life, good food and healthful work and recreation on members of the C.C.C. are emphasized by the fact that 14,000 young men, selected at random, showed an average weight gain of more than seven pounds during a six month period. And despite the period of undernourishment and mental turmoil that preceded their enrollment, the death rate per 1,000 members has been slightly over two per cent a year, as against eight per cent among unselected men of a similar age group.

Its welfare program provides for all types of athletics. Radios, newspapers and magazines are supplied. Each camp has a permanent and traveling library.

Strong Bodies in the Making—The Effect of Outdoor Life, Good Food and Healthful Work and Recreation.

A Lumber Company's Forest Nursery Producing 2,000,000 Trees a Year.

CONSERVATION AND THE LUMBER CODE

BY the accident of gross abundance, forests persisted in America for nearly three centuries without economic necessity for replacement; and so the manner of their conversion into usable products followed generally the pattern of the so-called wasting industries. Only in proximity to markets, capable of using lumber derived from second growth trees, was it feasible for the forest industrialist to establish a permanent enterprise, based upon timber regeneration. Forest management meant protection of mature stands. Young growth, having no demonstrable value, demanded no care or protection.

That a considerable number of permanent forestry enterprises existed in this country prior to the Code is, of course, a fact. A survey conducted in 1930 by a committee of the Society of American Foresters disclosed the surprising fact that 288 companies and individuals, owning tracts of more than 1,000 acres, were making conscious efforts to grow timber commercially upon nearly 30,000,000 acres of forest land. That these efforts often fell short of what would satisfy technical foresters can be assumed. But forty of these pioneers, in the face of many uncertainties, put their holdings on a sustained yield basis.

Throughout the East, where sawmilling first started, accessible markets gave substance to the natural urge of forest owners to perpetuate their sources of income. In the Lake States and Central South, where lumbering began somewhat later, lumbermen believed firmly that the natural destiny of their logged-off lands was to be farmed. When, in the 1920's, it became evident that mediocre forest lands were not needed for agriculture, some of the lumbermen turned to forestry.

However, many of the most successful private owners, keenly appreciative of the value of old growth timber, re-invested their lumber dollars in virgin forests. After the turn of the twentieth century, they were spurred on by the cry of "timber famine." Inevitably, there were piled up colossal investments in supplies of costly mature timber and in constantly increasing plant establishments, the productive capacity of which always exceeded the current requirements of the nation. The costs of manufacture, distribution and of timber storage tended to rise, but the uses of wood were being curtailed. When the depression of 1929 arrived, the bottom dropped out of the demand for forest products.

Code Representatives Inspecting the Adequacy of a Lumber Company's Fire Tools.

INDUSTRY'S PREDICAMENT

OWNERS of the far western forests needed most urgently to liquidate but also felt most acutely the competition of manufacturers in the regions they had quit because they thought the timber was gone. Operators who were aiding nature to grow new crops of timber in turn were subjected to the competition of small mills which were here today and gone tomorrow but whose aggregate output was great enough to well-nigh control market prices.

Forest industries in 1932 reached a twentieth century low in output and financial return, and an all-time low in morale. Harassed by debts and mounting costs, and bound by the restrictions of the anti-trust laws, operators were forced to keep their financial heads above water as best they might; and as labor became more plentiful, there resulted a crazy quilt pattern of wage scales and hours of labor in which men in one section received for a long day's work a smaller wage than did men in another section for an hour's work. For this all-but-hopeless group of industries, the National Industrial Recovery Act was providential.

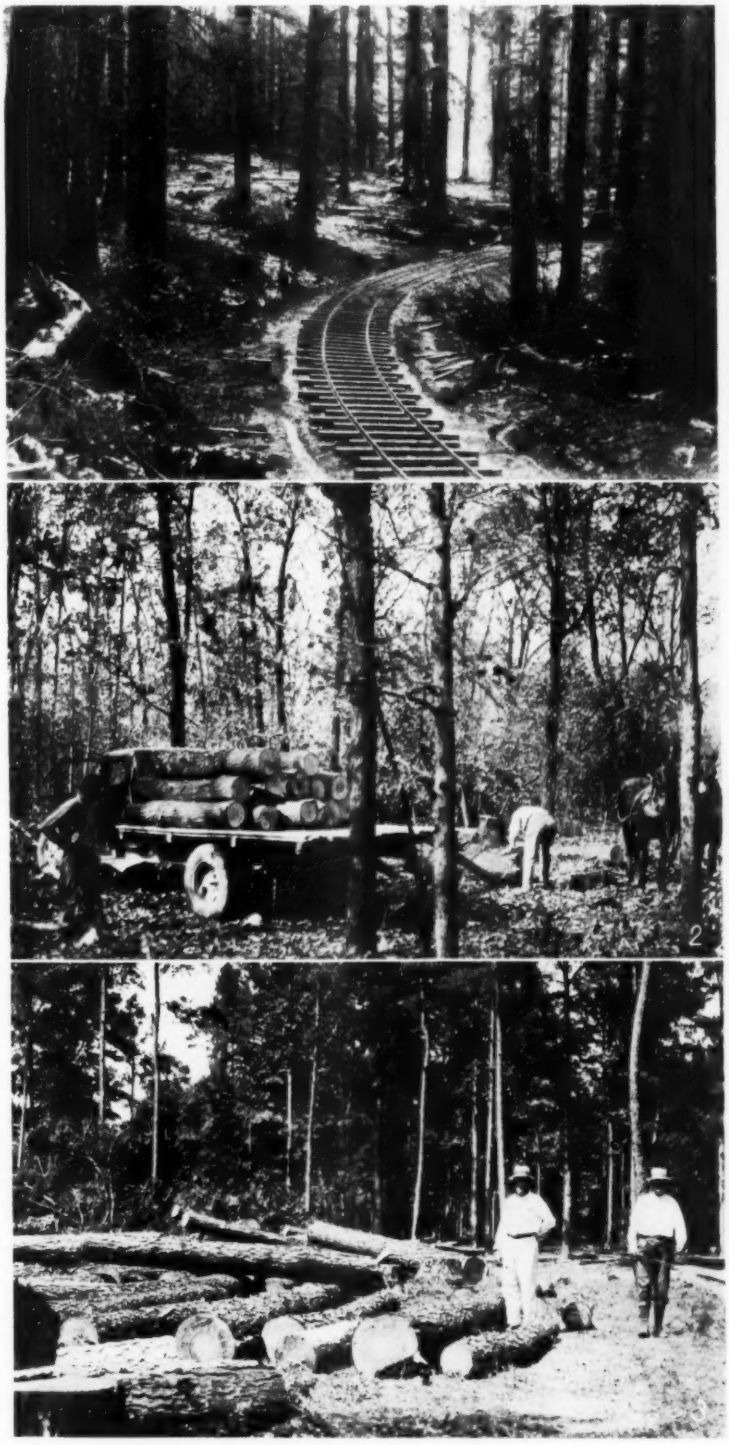
The most important purposes of the Recovery Act were to spread and better the conditions of employment and, in the natural resource industries, to conserve such resources. To this end, there were proposed for approval by the President of the United States codes of fair competition.

THE LUMBER CODE

ONE of the earliest Codes was the Lumber Code. It endeavored to establish a balance between provisions to save the forest industries and provisions to benefit workers and public at large. Most important of the latter were minimum wage standards and maximum hours of work; of the former, limitation of production, forest conservation and the establishment of minimum price.

The declared purpose of Article X—the conservation section of the Code—was to carry out practicable measures to conserve and sustain forest growth. It was an industry undertaking, to be aided by a broad program of State and Federal legislation, which should remove some of the economic obstacles to the practice of forestry. Not the least important consideration was that Article X was law and summarily removed the psychological obstacle of the threat of competition by those who would not practice forestry against those who would.

There were set up under the Code ten Administrative Agencies, composed of informed industry leaders, with advisory members of State and Federal Foresters, to formulate rules of forest practice, adapted to local conditions.



1. A Spruce-Hemlock Area in Oregon After Being Selectively Logged.

2. A Lumber Company in the Lake States Practicing Selective Logging in Hardwoods.

3. A Sustained Yield Operation in Alabama Harvesting a Second Crop.

An Operation in Washington Where Blocks of Second Growth Timber Have Been Reserved to Seed Clear-cut Areas. All Snags Have Been Felled.

Selective Logging, as Shown in This Pine Operation in California, Leaves the Young Trees for a Future Cut.

View of Same Operation Showing How Selective Logging Maintains a Growing Forest.

A THREE-POINT PROGRAM

THE conservation effort undertaken by the lumber industry followed three lines, most important of which was to change the industry, gradually, but as rapidly as possible, from a quick liquidation basis to one of sustained yield. To this end, the Lumber Code Authority asked for and secured an amendment to Article VIII of the Lumber Code, whereby operators, who should be certified by their Division Agencies as securing their raw materials from owned or controlled lands managed on a sustained yield basis, should be entitled to a ten per cent increase of periodic production allotments.

Improvement of woods practices, so as to save and encourage young growth, and better protection from fire of both young and mature timber, necessarily constituted an urgent and widespread objective. Contributing to both of these developments and to the sustained yield movement was an ambitious program of study, directed at the improvement of logging practices, the encouragement of selective cutting and, incidentally, the training of technical personnel to carry on the work for the industry and the public.

THE FIRST YEAR

FIELD direction of industry's efforts was in the hands of twenty-five technically trained foresters, whose experience especially fitted them for this type of administrative work. The United States Forest Service, charged by the Secretary of Agriculture with cooperating in these various activities, organized a staff of similar size, composed of specialists in economic studies and of men who had considerable experience in timber sale work and who knew the problems of the industry.

During the first year of its life—from June 16, 1933-1934 — the Lumber Code demonstrated the possibility of self-government by industry under code. The Code undertook to cure a number of the evils of the industry and it was natural that there should be persons affected by it, who chafed under its restrictions. Price-fixing, limitation of production and in some sections where changes in labor, hours and wages had been most drastic, the wage and hour provisions soon were seized upon as excuses for chiseling by a recalcitrant element. It was the function and duty of the Government to enforce compliance with all provisions of this Code, but such enforcement effort was not organized early enough to control the rising tide of non-compliance, which by number of violators was small, but which was disrupting in its effect upon others.

Longleaf Pine in the South Seeding in from Trees Left by the Logger.

ARTICLE X IN THE WOODS

THE administration of Article X passed through a preparatory period and so came to its time of actual application in the forests on June 1, 1934. Thus lumbering operations, affecting some 250,000,000 acres of forest lands in the United States, passed into a new era of conscious forest management. It was unfortunate that difficulties in administering other provisions of the Lumber Code were becoming serious and engaging a large part of the thought and effort of operators and their representatives on the Lumber Code Authority. Notwithstanding this handicap, Article X was taken to the woods and, by the end of the year 1934, fully two-thirds of all the output of forest materials from persons under the Lumber Code was produced in compliance with the rules of forest practice.

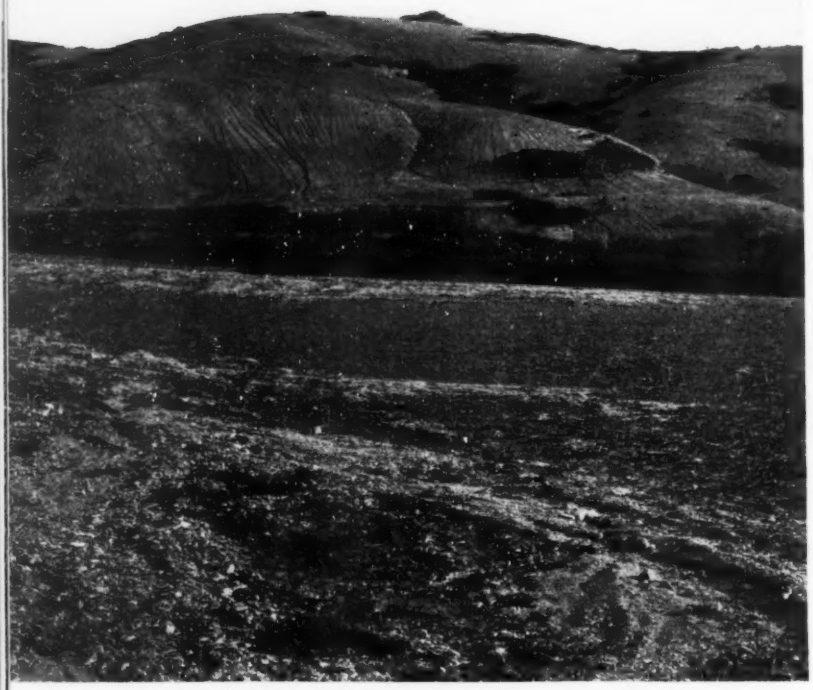
It should be understood, however, that the Lumber Code did not apply to the American farmer, whose woodlots aggregated more than 125,000,000 acres and whose right to treat these woodlots as badly as he chose was guaranteed by Section 5 of the National Industrial Recovery Act. Neither did it apply to the great pulpwood industry, nor to the producers of mine props, acid wood and a whole host of other forest producers. Doubtless, if the Lumber Code had remained in effect, these other groups in due course would have joined in conservation efforts. As a matter of fact, codes were pending for a number of these industries which would have called for woods practices similar to those prescribed by the Lumber Code.

CONSERVATION AFTER THE CODE

IN any attempt to evaluate the accomplishments of the lumber industry, it is, of course, necessary to understand the tremendous physical task of educating more than 33,000 operators in proper forest practices. It is still more important to understand that the transformation of such a great industry from timber-mining to forest-cropping is essentially a financial problem requiring the aid of State and Federal Governments to adjust taxes, increase protection, and to provide credit facilities fitted to the needs of forest culture. While these aids have been promised, so far they have not been provided. Finally, there must be the assurance of sustained markets for the materials which are to be reproduced in great volume at considerable cost.

The Lumber Code went out along with all other codes in May, 1935, but there remained an increased sense of the value of cooperative effort and a clearer understanding of the necessity for continuing the balanced benefits to operators, employees and the public, which were provided for by this Code. The industry signified its intention of continuing operations with the Code, or higher, wage scales. To the extent that is possible under the anti-trust laws, the Regional Associations will endeavor to restrict production to probable consumption. Conservation activities will be carried on by the Regional Associations and the National Lumber Manufacturers Association and, of course, the scope and vigor of such activities will be related to the financial condition of the industry and the measure of public cooperation obtained through legislation, both State and Federal.

A Fire Lane With Road Forms Part of this California Company's Forest Protective System.



This Photograph Taken in Utah Shows the Character of Land Left in the Public Domain and Its Overgrazed and Eroding Condition.

THE LAST OF A GREAT DOMAIN

Scenes of Starved Cattle Like This Are Common on the Public Domain, Due to Overgrazing Combined With Droughts.

LAND NOBODY WANTS

THE American policy of free land for homesteading and development came to a virtual end in 1934. More than three hundred years of settlement, however, have not exhausted the original heritage. After disposal of the choicest lands through the homestead, mining, timber and other acts, through grants to Indians, states, railroads and other corporations and after withdrawals for National Forests, Parks, reclamation and other Federal purposes, there remain approximately 172,000,000 acres to form the scattered remnants of the original Public Domain. With minor exceptions, these lands are located in the eleven far western states, with ninety-five per cent of their area in regions where the normal annual rainfall is less than fifteen inches— a fact which largely accounts for the Government's inability to dispose of them under its "free and easy" land policy. Unfit for agriculture, largely barren of tree growth, their chief value is as natural range for livestock and wildlife and as watersheds.

Through the years the shrinking Public Domain has been a grazing common for the livestock of all who cared to use it. Lacking regulation and protection by the Federal Government, it has been fought over by the stockmen and grazed under highly destructive methods with little or no thought of conserving the forage, the water, or the soil. Years of misuse and abuse have reduced the lands to a state that presents serious economic and social problems. The adverse effects on the livestock industry have greatly restricted community development and economic independence; watershed influences have been impaired by overgrazing and many species of wildlife have been all but exterminated.

DEPLETED RANGES

OVER much of the Public Domain, the growth of forage plants has been seriously depleted by overgrazing. Not only is the forage grazed too closely every year but livestock are often turned on the range in the spring when there is no old feed available and before new growth has sufficiently matured to reseed itself. As a result, vegetative cover has been reduced from fifty to eighty per cent of its original density over extensive areas. Much of the original growth of palatable perennial grasses, weeds, and browse has been destroyed, and its place taken by plants of low or no value for grazing. When drought prevails, the scant forage is soon exhausted; short calf and lamb crops result; losses of stock from starvation ensue; sacrifice shipments are forced at ruinous prices; and demoralization of an important part of the livestock industry follows.

The restoration of the Public Domain range and the conservation of forage by regulated management is therefore of vital concern to the western stockmen.

SOURCES OF EROSION

THE destruction of vegetation on the Public Domain and intermingled private lands of the West has so exposed the soil to wind and water erosion that billions of tons of fertile top soil have been lost. In the process, the soil's power to produce wealth through forage has been greatly reduced as has its ability to maintain a protective cover of vegetation. When heavy rains occur, brief though they may be, the vegetation is too scant to check the run-off and the water, cutting deeper and deeper gullies in its course, accumulates into floods which often carry a tremendous load of erosion debris. Highways and railroads are washed out or undermined; rich valley lands are ruined by the deposition of debris, and lives and property are not uncommonly lost. The Pueblo flood of June, 1921, cost seventy-eight lives and seventeen million dollars in property damage.

Throughout many parts of the West, winter range on Public Domain and private land is the key to wildlife conservation. Nearly one million deer, elk, antelope and other game animals must find feed in winter on range which has already been closely grazed by domestic livestock. Furthermore, in many cases, deterioration of better forage plants has often robbed the range of essential feed for game animals. In severe winters and drought periods, thousands of wild animals die from starvation and extermination of the species is seriously threatened.

From the standpoint of both water and wildlife, public welfare has long demanded an intelligent program of conservation and management of the lands constituting the remaining Public Domain.

An Experimental Area in New Mexico has Demonstrated How Regulated Grazing of the Public Domain Will Yield Abundant Forage and Fat Cattle.

THE DAWN OF RECONSTRUCTION

FOR over thirty years, conservationists have urged upon Congress that depletion of Public Domain lands be stopped and that their waning resources be conserved, developed and protected by orderly use. The first step in that direction was taken on June 28, 1934, when Congress enacted the Taylor Grazing Act "to stop injury to the public grazing lands by preventing overgrazing and soil deterioration, to provide for their orderly use, improvement, and development, to stabilize the livestock industry dependent upon the public range." Responsibility for carrying out the Act is placed upon the Secretary of the Interior.

The act provides that the remaining Public Domain shall be subject to sale, lease and exchange, and to the establishment of grazing districts on not to exceed 80,000,000 acres of unappropriated land. Homesteading in grazing districts is restricted to 320 acres and only lands classified as more valuable for agricultural crops than for pasturage are subject thereto. Following the passage of the Act, President Franklin D. Roosevelt withdrew all lands from all forms of entry except for mining purposes, pending their classification and disposition into grazing districts. Grazing districts are being established and plans are going forward to place the areas under administration. It is the Department's indicated policy to place as much administrative responsibility as possible upon the stockmen using the range by creating committees of local grazers to advise regarding the number and class of livestock, grazing seasons and other administrative questions, under the general guidance of the Department's Director of Grazing.

Thus forty-four years elapsed after the Commissioner of the General Land Office in 1890 reported there was no longer an American frontier, before the tradition of free land was abandoned and responsibility for the protection and development of the Public Domain was assumed by the Federal Government.

The Public Domain Includes the Hereditary Ranges of Many Wild Animals. Here Is Shown a Band of Antelope at a Waterhole on Public Lands in Nevada.

Bureau of Biological Survey

AROUND THE STATES
WITH
THE AMERICAN FORESTRY ASSOCIATION

Thirty Day Duck Season

Duck hunters will have thirty days for shooting this fall, but they will hunt in accordance with the most rigid regulations in the history of American wildfowling. So says the Biological Survey in summarizing new Migratory Bird Treaty Act regulations announced by the Department of Agriculture. Recommended by the Biological Survey, the regulations were approved in a Proclamation by President Roosevelt on July 30.

The new regulations, says the Biological Survey, are based on the necessity of having a net annual increase left over at the end of each shooting season until the depleted population of migratory waterfowl is restored to normal. This year's rigid restrictions, which follow a period of approximately thirty-five years during which the kill each year has exceeded the annual increase from breeding, are summarized by the Bureau, as follows:

Those species which are nearest the danger point of extinction, such as canvasbacks and redheads, will be particularly favored by the elimination of sink-boxes, sneak boats, and open-water shooting, practices which have been the chief methods of taking these species.

Shooting over baited water or land, which has furnished the heaviest toll from all species and accounted for the most consistent full bag limits, will be prohibited. Live decoys, one of the most effective methods of luring the migratory flocks to the blind, are also ruled out. None will be allowed. Zoning of States by seasons will be eliminated, and there will be only two zones, northern and southern. Shooting will be restricted to the hours between 7 A. M. and 4 P. M. Some bag limits have been reduced. The possession of more than one day's bag has been made illegal.

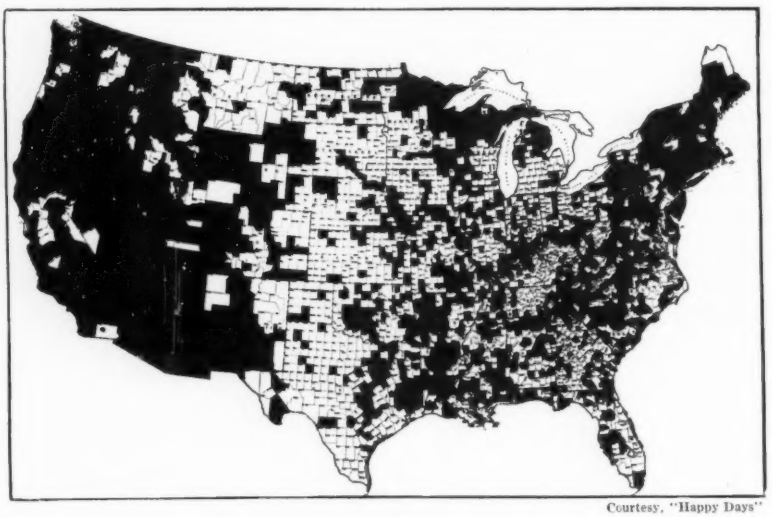
The three-shell limit placed on auto-loading and repeating shotguns last February will take effect for the first time this fall, and the new regulations provide that hunters may use a shotgun only, not larger than number ten gage.

Adoption of a short hunting season with heavy restrictions, says the Biological Survey, was the only alternative to a completely closed season. Though advocated by a considerable body of conservationists, including leading sportsmen and sportsmen's organizations, a closed season was considered ill-advised. Reports from Bureau investigators on the breeding grounds indicated that the needed net annual increase would be insured by a short season with heavy restrictions. At the same time, it was reported, the Bureau maintained that complete prohibition would be difficult to enforce. Loss of public support of the regulations and a breakdown of local enforcement through the cutting off of state operating revenues from the sale of hunting licenses were other obstacles to a closed season.

The principles that dictated the regulations, says the Bureau, are based on a mathematical progression toward restoration without breaking down existing law-enforcement organizations, either state or Federal, by the imposition of an impossible load.

The thirty-day shooting season, applying to geese, brant, jacksnipe, and coot, as well as to ducks, will open in northern states on October 21 and will close on November 19. In southern states the season will run from November 20 to December 19.

The new regulations place the daily bag limit on ducks at ten in the aggregate of all kinds and make the possession limit conform to this daily bag limit. Changes, says the Biological Survey, represent a reduction of two in the daily bag and of fourteen in the possession limit of the common species, but extra restrictions on certain species have been removed. Bag limits on geese and brant remain at four, but the possession limits have been cut in half, now conforming to the bag limits. The bag and possession limits on coot and jacksnipe are fifteen; woodcock, four; mourning dove, twenty; band-tailed pigeon, ten.



Courtesy, "Happy Days"

IN THIS NEW MAP OF THE CIVILIAN CONSERVATION CORPS, THE COUNTIES HAVING ONE OR MORE CAMPS ARE SHOWN IN BLACK. THE MAP INCLUDES THE NINE HUNDRED NEW CAMPS WHICH ARE BEING ESTABLISHED BETWEEN JULY 1 AND SEPTEMBER 15.

State Forest Bill Enacted

The Fulmer Bill, H. R. 6914, authorizing Federal cooperation with the States in acquiring, developing and administering land for State Forests, was approved by the President on August 29. It passed the House on August 15 after having been recalled for further consideration and was adopted by the Senate, in an amended form. One amendment would reduce the authorization for appropriations from $20,000,000, as originally stated, to "a sum or sums of $5,000,000 as Congress may from time to time appropriate." While in reality this is a loan to be repaid by the States, the reduced amount is believed to be more acceptable to the administration.

Another amendment introduced by Senator McKellar, of Tennessee, who recalled the bill August 1, after it had passed both House and Senate, deprives the Secretary of Agriculture of authority to give preference to States whose forestry organizations are employed upon the basis of merit. As finally passed, the bill contained a clause reading: "The State shall, after passage of this act, provide for the employment of a state forester, who shall be a trained forester of recognized standing."

Senator McKellar, of Tennessee, said the original bill "virtually provides that the Federal Government shall select all State officers, and control them entirely. I think the matter should be left to the States."

Representative Hampton P. Fulmer, of South Carolina, who guided the bill through the House and Senate, has declared its enactment is the beginning of a period when State forest ownership will assume an importance comparable with that of the National Forests. While title to lands purchased with funds authorized in the bill will remain with the Federal Government, their administration may be turned over to the State in accordance with plans mutually agreeable to the state forester and the Secretary of Agriculture. One-half of all receipts from the newly purchased forests will be returned to the Federal Government until they total the original cost of the land, when title will pass to the State. The lands will first be selected by the state forest service in cooperation with the Federal Forest Service, with final approval of all purchases by the National Forest Reservation Commission.

Typical of the work International Trucks are doing in the lumber industry is this illustration showing a 2 to 3-ton Model C-40 at work in Northern Idaho. It is the latest addition to the fleet of 7 Internationals operated by Larson & Johnson to haul out logs from an 8,000,000-foot project in the St. Joe River district. After a four-mile trip down a most difficult single-lane logging road and another mile and half on one of the river valley roads, the logs are dumped into the St. Joe River and floated down to a sawmill at St. Maries.

Depend on International Harvester Equipment for Economy

FOR the economical solution of your hauling and power problems, come to International Harvester, manufacturer of International Trucks and McCormick-Deering Industrial Tractors and Power Units. The International Truck line ranges from the sturdy Half-Ton unit in the low-price field up to powerful Six Wheelers for the heaviest hauling. The McCormick-Deering Tractor line includes wheel and crawler types. A Diesel-powered crawler tractor and power unit are also available.

Lay your truck or tractor requirements before the nearest branch. Let them specify the right size of truck, tractor, or power unit for the jobs you have. Write us for information.

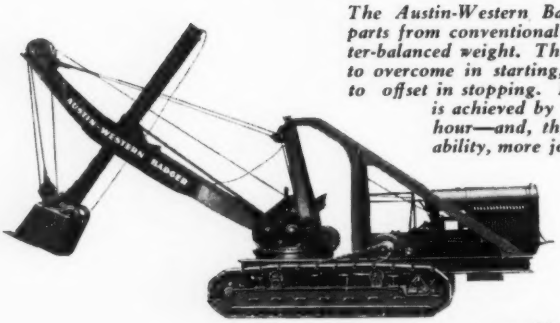
INTERNATIONAL HARVESTER COMPANY
OF AMERICA
(Incorporated)

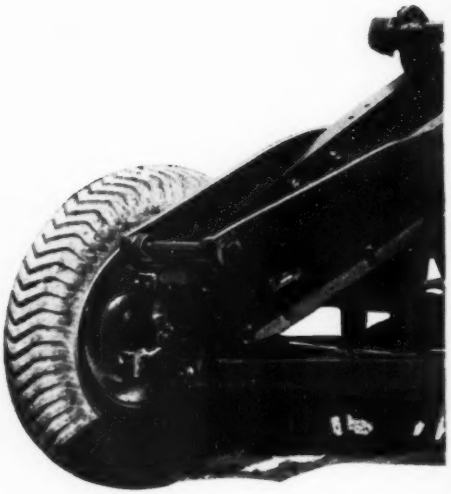
606 So. Michigan Ave. Chicago, Illinois

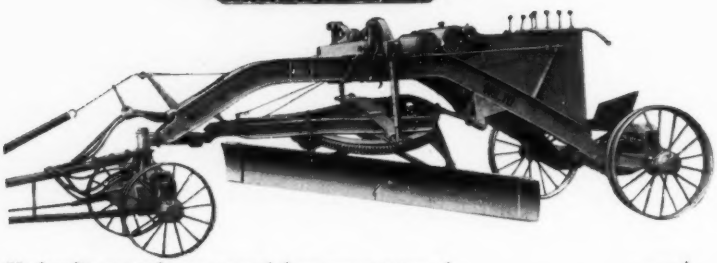
INTERNATIONAL HARVESTER

To TAKE HOLD

The Austin-Western Badger Shovel departs from conventional designs of counter-balanced weight. There is less inertia to overcome in starting, less momentum to offset in stopping. Its great capacity is achieved by more buckets per hour—and, through easy portability, more jobs per day.







Hydraulic controls, so successful on many types of Austin-Western machines, bring greater scope to the No. 10 Blade Grader. With this improved control system the operator can now raise and lower, reverse and side-shift the blade, lean the front or rear wheels, shift the frame on the rear axle, and steer—each move at a touch of the control valves—all faster and more positively.

The Austin-Western Trailbuilder has the outstanding advantages of least overhanging weight and complete operator control. By designing the shortest possible couple between tractor and blade and by the use of light tough alloy steels the strength of the blade has been increased yet the power required to raise it has been reduced. Also, the operator can raise or lower either end of the blade hydraulically from his seat in the tractor, without stopping to make adjustments.

Austin-Western portable and stationary Crushers form effective units on new road construction. The one shown here is a 9" x 40" Roller Bearing Crusher with power unit, and 28-foot elevator are mounted together on a truck as shown. Rocks excavated on the job are put through this unit to supply aggregate on the job.

of the Job

The Austin-Western Dual (4 wheel) drive motor grader with complete hydraulic controls will tackle the heaviest kind of going and come through. Its peculiarly effective tractive power operating on each drive wheel makes it possible to do an all 'round job more effectively than any similar outfit. The hydraulic controls with their complete simplicity of design not only provide the most positive handling but eliminate 68 moving parts necessary in mechanical controls.

★ Every responsible individual in the forestry service can tell when the energy, sweat and brains that go into a job are being applied *effectively*—or are dribbling away in lost motion. In many cases equipment is the underlying cause, one way or the other.

Everywhere on government and private projects Austin-Western machines are respected for their ability to *take hold*—prevent waste of energy, directly tackle the job and get results.

Each machine shown here (and the many others of this complete line) is marked by some special ability to tackle a job in the most effective way. It may be design for extra traction, or a little different application of power, or special design for higher speed and greater capacity, but it shows up big in results. Read the brief captions for the five types of machines. Send the coupon for latest bulletins on any or all of these machines.

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The Austin-Western Road Machinery Co.,
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Please send bulletins on the following A-W machines:
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Atlas Apcodyn
(Marked Gicodyn in
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BLASTING *in* DRY PERIODS

without danger of setting fires

depends on proper explosives—properly used.

In the complete line of Atlas explosives you'll find those that are extensively used for forestry and timbering operations under dry conditions. Among these are standard brands sold under the name Gicodyn in Western Atlas Giant Division territory and under the name Apcodyn in other Atlas territory.

They develop rated strength and have proper velocities for the various field jobs. They are uniform and dependable and enable the blaster who loads and fires them properly to continue his blasting work without hesitation.

Other brands of Atlas explosives are suitable also for use in dry locations. See the Atlas representative for latest information concerning both explosives and methods.

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ATLAS
EXPLOSIVES

ATLAS EXPLOSIVES

Bartlett Tree Tools

This Tree Trimmer has the Compound Lever and also double leverage due to the pulley which is attached to the curved lever. This tool will sever any branch up to 1¼" in diameter with the slightest effort.

For larger limbs we recommend our No. 44 Pole Pruning Saw with 16" blade.

For your convenience we will furnish both the No. 1 W and No. 44 with head sections 30" overall and extra sections 6 or 8 ft. as you desire fitted with self locking sleeve connections.

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New Forest Purchase Program Includes California Lands

Approval by the National Forest Reservation Commission on July 30 of two parcels of land totaling 200 acres at a cost of $55,000 on the floor of the Kings River Canyon, in the Sequoia National Forest, California, marked the first case in which authority of the Clarke-McNary Act has been used for the purchase of lands west of the Great Plains. The probability that these tracts of forty and 160 acres would be subdivided and sold for building lots, was believed to endanger the public use of the National Forest and was the immediate cause of the purchase.

Purchases totaling 946,804 acres at a cost of $3,493,328 were approved at this meeting, following assurance that $15,000,000 had been allotted from Work Relief funds to continue the land purchases for National Forests. This was made in two allotments—one, amounting to $3,000,000, having been announced in AMERICAN FORESTS for August, and another of $12,000,000 which was approved by the President's Allotment Board on July 23.

These sums bring the total allotments for forest land purchases since June 9, 1933, to $45,000,000. During this time, and including the approvals of July 30, a total of 9,372,810 acres have been approved for purchase.

The heaviest purchases recently approved were in the Appalachian, Ozark, Southern Pine, and Lake and Upper Mississippi States forest areas. Land purchases were approved also in the New England and the Piedmont areas. Classed by Forest Service administrative regions, 407,462 acres approved are in the Southern Region, 217,373 in the Northeastern Region, 324,769 acres in the Lake and Upper Mississippi States, and 200 acres in California.

Some of the larger areas to be incorporated with the various National Forests and purchase units are: 88,575 acres in the George Washington National Forest, in Virginia and West Virginia; 81,684 acres in the Ozark National Forest, in Arkansas; and 68,970 acres in the Cherokee National Forest, in Georgia, Tennessee and North Carolina.

First purchases approved in new units formed by the Commission in the last year were in the Oakmulgee, in Alabama; the St. Francois and the Table Rock, in Missouri; the Lafayette, Lost River, Patoka, and Pleasant Run, in Indiana; the Little Scioto, McArthur, Hocking Valley, and Symmes Creek, in Ohio; and the Souris, in North Dakota.

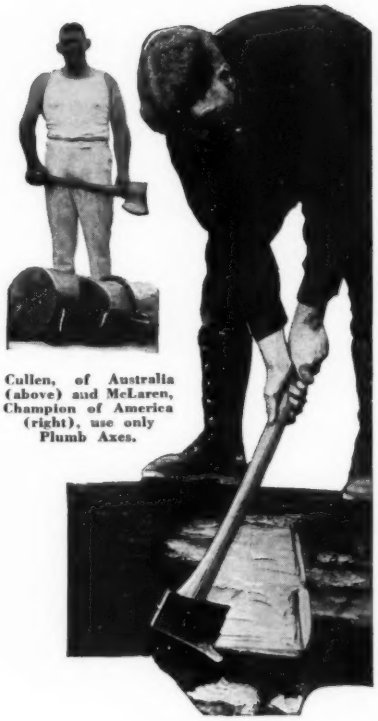
Several purchases were made in state forest areas in Michigan for the purpose of exchanging for areas of equivalent values of state lands within the National Forests in that State.

The Commission approved changing the name of the Luquillo National Forest, in Puerto Rico, to the Caribbean National Forest and combining the old Luquillo and the Toro Negro into one National Forest.

Within about two years prior to April 1, 1935, the Commission approved more than 8,000,000 acres of forest lands for purchase by the Forest Service and incorporation within the National Forests of the eastern half of the United States, more than doubling the area of National Forests east of the Great Plains. In the same period, the Commission also authorized the establishment of many new units, so that National Forests are now found in most of the states.

Immediately upon approval by the Commission, the Forest Service is authorized to begin improvement on the lands, in many places employing labor as well as distributing payments for the lands as soon as the titles are proved. A large number of C.C.C. camps, located on or in the vicinity of the new purchases, will also aid in the improvement work.

The Axe of CHAMPIONS



Cullen, of Australia (above) and McLaren, Champion of America (right), use only Plumb Axes.

Why does nearly every champion chopper use a Plumb Axe?

Why does McLaren, Champion of America, use only a Plumb?

Why did the winners in all eight events at the Championship Matches in Melbourne last year use Plumb Axes?

For speed, of course! The Plumb is acknowledged to be the fastest axe on earth.

But more than that! Champions know that Plumb Axes are made of special steel . . . that they are hardened and tempered scientifically in modern electric furnaces . . . that every blade is hard, tough, edge-holding and uniform in quality.

They know that the weight is properly balanced in a Plumb, so that it will work with the natural swing of their arms.

They know that the blade is tapered to roll the chip and clear the cut.

They know that each handle is of springy, young hickory, individually strength-tested.

Use the Axe of Champions. It costs no more! And there is a complete Plumb line for every chopping need.

FAYETTE R. PLUMB, INC.
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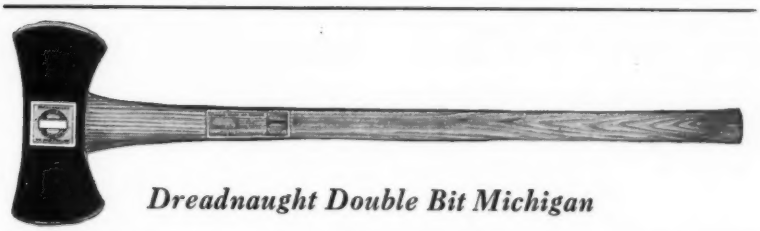
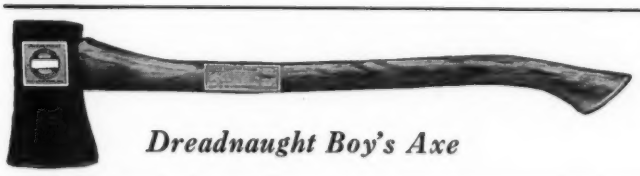
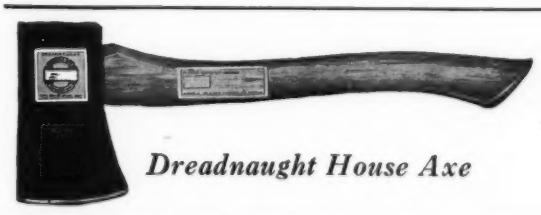


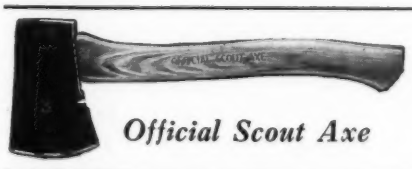
Dreadnaught Double Bit Michigan



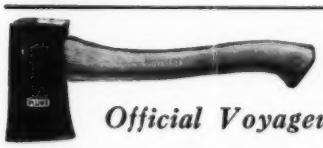
Dreadnaught Boy's Axe



Dreadnaught House Axe



Official Scout Axe



Official Voyageur's Axe

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Use the MODERN High Bank Cutting

ALLIS-CHALMERS TERRACER

Only Allis-Chalmers Terracers have the High Bank Cutting feature — which saves 25 to 50 per cent on time required to tear down old bench terraces. Benches 3 to 5 feet high are pulled down without stopping the tractor for changes or adjustments . . . simply by placing the moldboard in high bank cutting position. Time is saved . . . work is done easier . . . at lower cost.

Another important aid to undercutting old terraces is the unusually long side shift of the circle assembly . . . 40 inches . . . providing long blade reach outside the wheels. Exclusive wide frame permits blade lift cranks to turn in complete circle — permitting extreme blade positions never before possible. Also increases stability on steep slopes.

Model "K-O" Oil Tractor

The 48 H.P. Model "K-O" Allis-Chalmers Oil Tractor furnishes ideal power for terracing. Diesel fuel is injected with a Diesel pump and ignited with a spark. Compression pressures are much lower — resulting in easier starting, smoother operation, less vibration, fewer repairs . . . Lowest Final Cost.

Tears Down Old Bench Terraces ... Builds New Modern Terraces

No matter what the terracing job . . . the advanced design of Allis-Chalmers Terracers is a distinct advantage. Finest construction throughout . . . same all-bolted construction so successful in A-C tractors and graders. Heavy draft spring hitch affords protection against shocks. Ball and socket connections have provision for taking up wear. Write for folder on High Bank Cutting Terracer.

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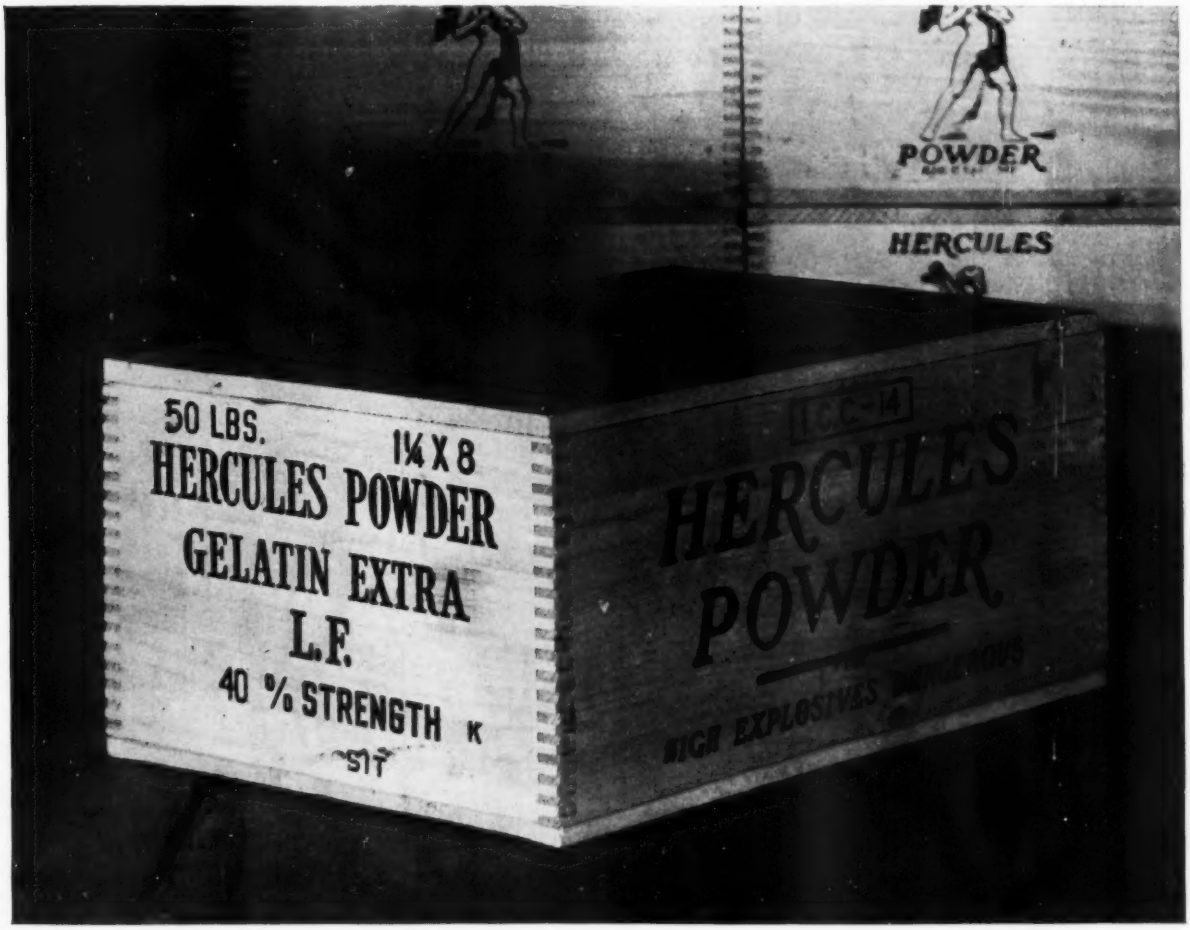

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Write for details regarding the use of these Hercules explosives for breaking boulders, blasting ditches, stump blasting, breaking rock ledges, tree planting, subsoiling, soil erosion, and tree rejuvenation.

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And Now a 30 Day Free Trial of

COMBINATION BRASS NOZZLE FOR 30-FOOT STREAM OR A LONG COARSE SPRAY. NOZZLES CHAINED TO PUMP AND CANNOT BECOME LOST
HEAVY BRASS, QUICK OPENING WATER TIGHT FILLER CAP WITH REMOVABLE BRASS STRAINER. CAP HAS INSIDE CHAIN TO PREVENT LOSING.
COMBINATION BRASS HANDLE FOR CARRYING TANK AND FOR HOLDING PUMP
EXTRA HEAVY TANK HAS SOLID BRASS BOTTOM. ALL JOINTS LOCKED AND BOLDERED. BUILT STRONG.
PATENTED
FORM-FITTING. VENTILATED TANK GIVES A CONSTANT CIRCULATION OF AIR BETWEEN TANK AND CARRIER'S BACK. IT PROTECTS THE BACK FROM THE COLD WATER AND MOISTURE IN THE TANK AND KEEPS THE BACK WARM AND DRY. THE FORM-FITTING SHAPE OF THIS TANK FITS THE BACK PERFECTLY. SNUG AND FIRM AND FEELS GOOD.

THE INDIAN FIRE PUMP

Offered Forestry Officials!

Any member of a state or federal forestry service may now try out the famous INDIAN FIRE PUMP for 30 days *at no obligation! This is the first time we have made this offer.* Prove to yourself the advantages of THE METAL TANK which never collapses, fits the back snugly and will not ROT or PUNCTURE. Get your INDIAN, use it, abuse it, learn first hand why it is the foremost extinguisher ever made.

The INDIAN uses only clear water, no chemicals to buy or bother with. Quickly refilled from stream or faucet. Throws 50-foot unbroken fire stream with ease. Ventilated tank feature keeps carrier's back warm and comfortable and this is a great aid in the hazardous work of fighting fires. The INDIAN combines the ideas of the foremost authorities on forest, brush, grass, and grainfield fire fighting. Inquiries invited. Complete information and literature on request.

INDIANS in action! They never fail in an emergency.

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HUDSON FIRE DEPARTMENT
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Gentlemen:—The Indian Fire Pumps we have on our trucks are the finest portable extinguishers I have ever used. They are the quickest, most economical means of extinguishing grass, brush, rubbish, awning or roof fires. The fact that the Indian only uses clear water permits the operator to refill the tank again and again without expense. Time after time we have succeeded in putting out large grass fires with our Indians, without having to lay any hose.

Very truly yours,
FRANK MITCHELL,
Fire Chief.

INDIAN Fire Pump

***(At Right)* Carrying Handle Showing how pump can be carried by hand. Heavy brass pump instantly snaps in and out of handle.**

We Have Supplied Thousands of INDIAN FIRE PUMPS for Use in Government C.C.C. Camps

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Dutch Elm Disease Eradication Work Assured For One Year

Continuation of extensive efforts to eradicate the Dutch elm disease was assured on July 27 when President Roosevelt signed the order releasing $2,500,000 of work relief funds barely an hour before exhaustion of the existing allotments would have made necessary the dismissal of 2,500 men. Supplementing the allotment, was an order from the Work Relief Administration exempting 1,600 men from the obligations under which ninety per cent of those employed by work relief funds must come from recent relief rolls.

With this larger sum and the greater freedom of expenditure, it is expected that approximately 4,000 men can be employed to scout for infected elms and destroy the diseased trees as they are discovered. It is also expected that scouting will be extended beyond the infected 5,000 square miles around New York City—in New York, New Jersey and Connecticut—and into suspected areas in such states as Indiana, Maryland, Ohio and Virginia where infected trees have been found. The funds will be available until July 1, 1936.

The Dutch Elm Disease Eradication Headquarters at White Plains, New York, reports that 9,181 elms have been definitely identified as infected since the campaign began last summer. Of these, 8,438 had been destroyed by July 25. In addition, 493,031 dead and dying trees have been felled and burned, and 389,389 additional trees marked for destruction are being taken down and burned with all possible speed. While these trees may not be infected with Dutch elm disease, they are sources from which the disease may be transmitted. Furthermore, by removing all dead and weakened elm trees, the progress of the bark-boring beetles which carry the diseased organisms is arrested.

Tule Lake Refuge Enlarged

The enlargement and more adequate protection of the Tule Lake Wildlife Refuge, in northern California, is assured through cooperation recently extended the Biological Survey by the Bureau of Reclamation. Under plans agreed upon by these bureaus the entire area of 50,000 acres will be turned over to the Biological Survey. The original area of 10,000 acres reserved from reclamation development had proved inadequate.

Portions of the area will be fenced to make them more desirable for the thousands of wild fowl which annually use the lake and surrounding marsh for nesting and breeding. The Biological Survey will supervise any burning of the marsh lands. Limited agriculture will be permitted within the area, and arrangements will be made with local settlers to plant crops which will help provide food for the birds.

SINGLE & DOUBLE BIT

AXES

ALL PATTERNS

✦

HIGHEST QUALITY FOR THE LAST HALF CENTURY

ALL KINDS OF

LOGGING TOOLS

CHAIN HOOKS, SWIVELS, COLD SHUTS & EVERY TOOL KNOWN FOR LOGGING. ALSO PULASKI MULTI-USE TOOLS

WARREN AXE AND TOOL CO., Warren, Pa.

A Galion Motor Patrol Grader with Double Drive leveling off crushed stone surface on a highway in the West.

Nearly 30 years of experience in serving the road building industry enables Galion to provide a machine exactly suited to the job. The line includes: Motor Graders—Pull Type Graders—Road Rollers—Spreaders—Rooters—Drags and Scrapers.

The Galion Iron Works & Mfg. Co.

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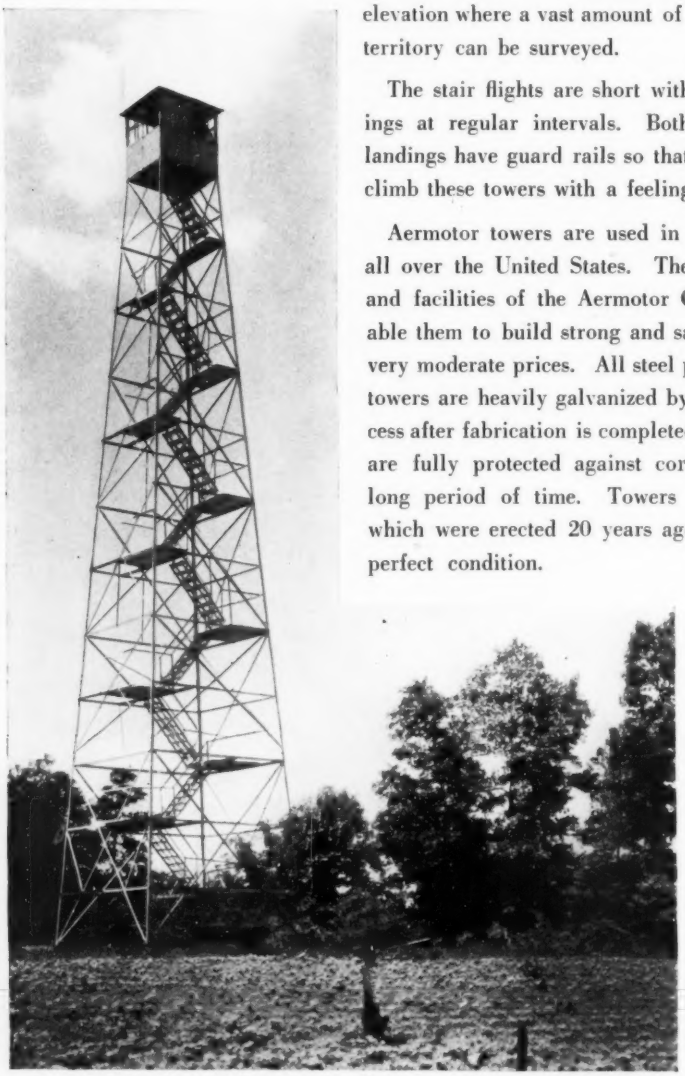
Fire Prevention Towers

The Aermotor Company made a great contribution to the means employed for the preservation of our forests when it devised these observation towers. They enable the observer to climb with ease to an elevation where a vast amount of surrounding territory can be surveyed.

The stair flights are short with large landings at regular intervals. Both stairs and landings have guard rails so that anyone can climb these towers with a feeling of security.

Aermotor towers are used in forest areas all over the United States. The experiences and facilities of the Aermotor Company enable them to build strong and safe towers at very moderate prices. All steel parts of these towers are heavily galvanized by the hot process after fabrication is completed so that they are fully protected against corrosion for a long period of time. Towers of this type which were erected 20 years ago are still in perfect condition.



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AERMOTOR CO.
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GREETINGS—AMERICAN FORESTRY ASSOCIATION ON YOUR 60TH ANNIVERSARY!

We, too, are proud of nearly a half century of uniform tailoring—serving both Federal and State Foresters.

Proud, too, of the NEW REGULATION FIELD CLOTHES, which we are making for the Regular Personnel of The U. S. Forest Service.

Made of the SPECIFIED materials, strictly according to REGULATION—and GUARANTEED TO FIT and GIVE COMPLETE SATISFACTION!

Write for our descriptive Price List and Samples—No obligation!

THE FECHHEIMER BROS. CO.

CINCINNATI OHIO

Million Acres For Ducks

More than 1,000,000 acres of waterfowl breeding, feeding and refuge grounds have been purchased by the Biological Survey under its new acquisition program made possible by the allocation of emergency funds for that purpose.

The more important areas acquired are: Lake Malheur and Blitzen Valley, in Oregon, 64,720 acres; Sabine Lake, in Louisiana, 145,000 acres; Lower Souris Lake, in North Dakota, 64,400 acres; Valentine Area, in Nebraska, 65,430 acres; Mattamuskeet Lake, in North Carolina, 50,000 acres; Red Rock Lakes, in Montana, 25,000 acres; Sand Lake, in South Dakota, 23,100 acres; Seney Lake, in Michigan, 24,630 acres; Turnbull Area, in Washington, 3,000 acres; Sacramento Area, in California, 11,000 acres; White River Area, in Arkansas, 110,000 acres; Lake Ison, in Tennessee, 4,800 acres; Muleshoe Lakes, in Texas, 8,000 acres; Chautauqua Area, in Illinois, 4,500 acres; Squaw Creek, in Missouri, 11,400 acres, and Mud Lake, in Minnesota, 53,000 acres.

Lumber Company Gets RFC Loan

A loan of $4,000,000 to the Crossett Lumber Company, Crossett, Arkansas, for construction of a one-hundred-ton kraft pulp and paper mill, was approved by the Reconstruction Finance Corporation on August 10. The loan is reported to be secured by $8,000,000 in collateral furnished by the Crossett Company which includes 370,000 acres of timber land. Under the terms of the loan, the administration of these lands is expected to serve as an outstanding example of a sustained yield operation. It will work to the advantage of neighboring communities and farm woodland owners as well as to the company itself. The new mill will be erected for the manufacture of kraft paper from Southern pine under the process developed by Dr. Charles H. Herty, of Savannah, Georgia. In addition to the kraft paper for which this mill is designed, it is estimated that newsprint paper can be manufactured under the Herty process from southern pine at an operating cost of about $19.06 a ton.

New Soil Erosion Projects

The Federal Government on August 5 launched a new soil erosion program involving ninety-three control projects and the continuation of forty-seven others already under way.

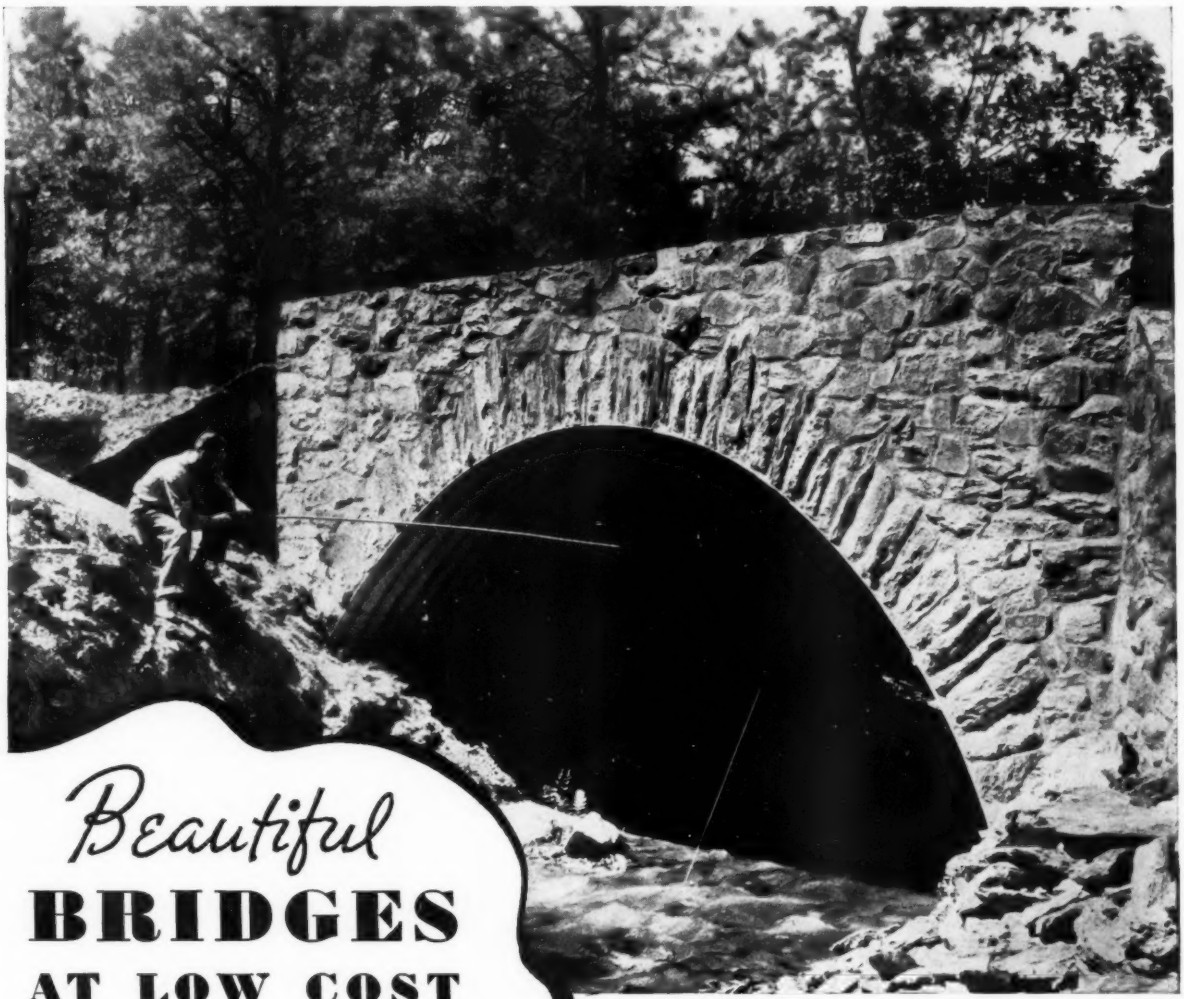
H. H. Bennett, chief of the Soil Conservation Service, declared that the new projects will involve work in forty-two states. Funds were allotted from work funds by President Roosevelt.

Mr. Bennett said the new administration areas will average approximately 25,000 acres each and include representative farm and grazing lands in various sections of each of the forty-two states. Existing demonstration projects range, he said, from 40,000 to 16,000,000 acres in size.

The projected program involves the application of a complete land use and land treatment program designed to curb the distribution of soil resources by wind and water erosion and minimize flood hazards.

Terracing, gully-checking, strip-cropping, reforestation, contour cultivation and other effective measures of erosion control will be employed either singly or in combination, he said, depending on the requirements of each type of land.

The largest projects will be in New Mexico and Arizona, for which more than $4,000,000 has been allotted. Nearly $3,000,000 has been allocated for projects in Texas and Oklahoma.



Beautiful BRIDGES AT LOW COST

Attractive Armco MULTI PLATE bridge built on a forest road. Span=21 ft. 3 in., rise=7 ft. 7 in.

BRIDGING small streams is often a perplexing problem, especially when costs are a consideration. However, it is possible to build strong, durable small bridges at a very reasonable cost.

The answer is an Armco Multi Plate arch or pipe. Without the use of expensive equipment, local, unskilled labor can readily assemble the pure, rust-resisting Armco Ingot Iron plates. Backfilling and tamping can be started at once or at your convenience. And by using headwalls of native stone, as much or as little labor as desired can be used to make a neat, attractive installation.

We shall gladly supply you with a catalog, prices, and additional information on MULTI PLATE or have a representative call and without obligation discuss your drainage problems with you. Just address Armco Culvert Manufacturers Association, Middletown, Ohio.

CONGRATULATIONS!

Attaining its 60th Anniversary is a laudable event for AMERICAN FORESTS—one of which all people engaged or interested in forestry can well be proud.

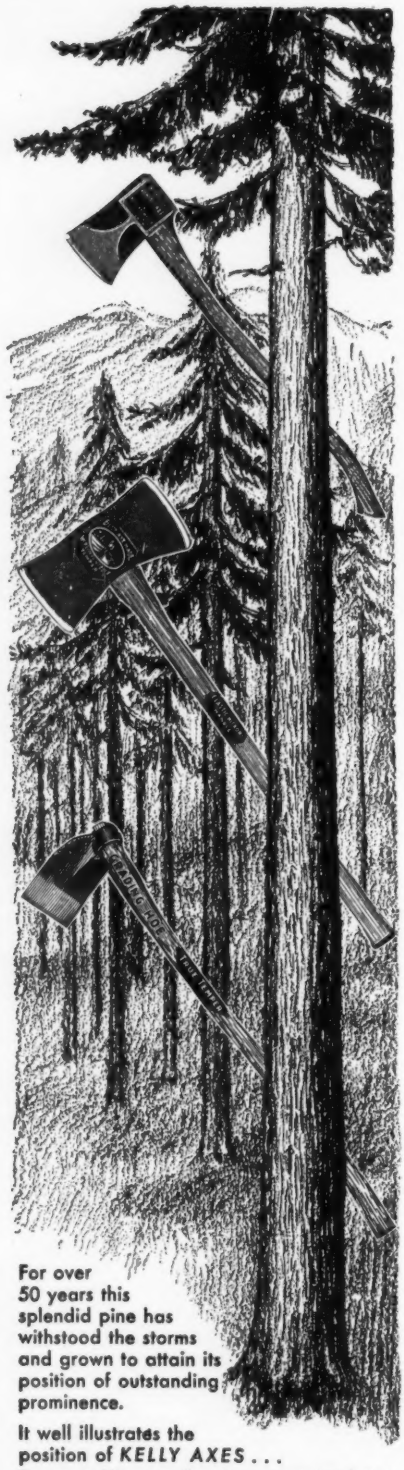
For the last 30 years of this period, Armco Ingot Iron drainage products have been serving the forest areas of this nation, helping to make them more accessible and more useful.

Besides the Multi Plate structures described here, other Armco products available are plain galvanized pipe, Paved Invert Pipe, perforated pipe, open-top relief culverts, drainage gates and metal crib retaining walls.

MULTI ARMCO PLATE

ARMCO MULTI PLATE

When Writing Advertisers—Mention AMERICAN FORESTS



For over 50 years this splendid pine has withstood the storms and grown to attain its position of outstanding prominence.

It well illustrates the position of *KELLY AXES* . . .

For over 50 years they have sustained their reputation for DEPENDABLE QUALITY.

AXES
BUSH HOOKS
FIRE RAKES
GRADING HOES

TRADE MARK
TRUE TEMPER
KELLY
QUALITY

FOREST
FIRE
FIGHTING
TOOLS

MANUFACTURED BY
THE AMERICAN FORK & HOE CO., Cleveland, O.
(Any Hardware Dealer Can Supply)

C.C.C. Enrollment Increasing

With more than 430,000 young men enrolled in the Civilian Conservation Corps up to August 10, Robert Fechner, director of Emergency Conservation Work, expects to have the Corps' new quota of 600,000 men filled early in September. Enrollment in late July and early August was at the rate of 26,000 men a week, and this rate is expected to be maintained if not increased. One of the chief difficulties at the present time in building the Corps to its full quota, it was pointed out, is the increasing rate at which members are leaving the Corps to accept work in private industry. Throughout July and early August enrolled members were leaving the Corps at the rate of 6,000 a week.

Mr. Fechner also announced that educational facilities in the C.C.C. would be virtually doubled to take care of its increased strength. A total of $6,000,000 has been allocated for educational work in the 2,916 camps which it is planned to operate under the expansion program.

In outlining a program of instruction for the increased camp student body, the Office of Education, Department of the Interior, which acts in an advistory capacity to the War Department, is concentrating its efforts toward greater training of individual camp educational advisers; development of outlines of instruction in vocational subjects such as agriculture, forestry, carpentry, cooking and automotive mechanics; providing instruction for all illiterates; development of constructive, worthwhile activities such as arts and crafts, health and physical education, and assisting young men in finding jobs by providing instruction in how to sell their services to prospective employers.

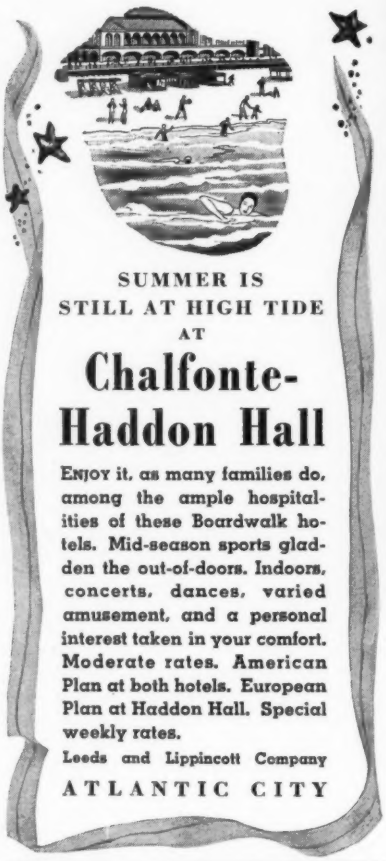
Nation Consumes Half of World's Lumber

"The United States produces and consumes, roundly, half of all the lumber of the world," reports the New York Society of Architects. "About eighty per cent of all residences in the United States are wood-built, and on the farms ninety-eight per cent of all structures. Because of its abundance, prevalence and comparative cheapness, lumber has been crucially associated with the economic history of the country," the Society states.

"The vast forests of the East and South provided the early frontier with domestic and industrial fuel at low cost; and excellent housing material, easily worked and highly sanitary. The forests furnished the material for the first blossoming of industrial life in the form of countless sawmills.

"Even today, after the advent of many different competing materials, the lumber industry ranks near the top with some 20,000 mills, $7,000,000,000 of capital investment, employing directly and indirectly in good times more than a million men. With the disappearance of the frontier, the industry is changing from a purely extractive to a reproducing industry. The private forests are beginning to be systematically regrown and perpetuated; already about forty per cent of all lumber comes from renewed forests. Back of this adaptation, are the vast public forests containing about one-half the total standing timber, which are on a sustained yield basis," the Society states.

"Today it is as convenient to have an all-lumber house as it was a hundred years ago—and incomparably better. No house is entirely desirable without some beautiful and 'friendly' wood. Architects and engineers may specify wood with a degree of dependence hitherto unknown and with a certainty regarding quality, dimensions and milling refinements unknown until recently, combined with effective treatments for combustibility, decay, insect injury and moisture effects."



SUMMER IS STILL AT HIGH TIDE AT

Chalfonte-Haddon Hall

ENJOY it, as many families do, among the ample hospitalities of these Boardwalk hotels. Mid-season sports gladden the out-of-doors. Indoors, concerts, dances, varied amusement, and a personal interest taken in your comfort. Moderate rates. American Plan at both hotels. European Plan at Haddon Hall. Special weekly rates.

Leeds and Lippincott Company

ATLANTIC CITY

Idaho School of Forestry

University of Idaho

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Offers thorough training in practical forestry, preparing for Federal, State and private work.

Four and five year courses, leading to the degrees of Bachelor of Science in Forestry and Master of Science in Forestry respectively.

Opportunity is given to specialize in general forestry, wood utilization and range management

Large logging and milling operations, important wood-working industries and extensive Federal, State and private forests are near at hand. Excellent opportunity for summer employment.

Catalog Free.

Case Plow in use on U. S. Forest Service Project.

A CONTRIBUTION to FOREST CONSERVATION

Plenty of room for worker and seedling in the furrow from this big forest plow.

Note the rocks as well as the growth and topography amid which these furrows were made.

This new Case Plow is designed to do well many types of forest work . . . making fire lanes or running emergency fire lines, furrowing for seedlings and all other heavy plow jobs.

It is made to follow through anywhere that a tractor can go. Being unusually narrow and compact, it has ample clearance even when swinging in on curves. Its two large wheels with broad, heavy tires will stand tough going.

With operator on the rear platform, there is plenty of weight to hold the big bottom to its work. From this vantage point he adjusts the screw-type bottom lift with the big hand-wheel. Without slowing down he makes every desired setting for furrow depth, or spins the plow out of the ground to ample clearance. The flexible hitch can be made stiff for transportation.

The dust-proof rolling coulter, made of heat-treated steel and reinforced by malleable hubs, is more than a coulter. It serves as a guardwheel protecting the plow point from roots and rocks. Like the wheels, the coulter has removable bushing and pressure gun lubrication.

The plow share is of crucible steel. The moldboard, of soft-center steel, combines toughness with good scouring. There is a wear-resisting (chilled) slip-heel on the landside, and a moldboard extension.

We invite you to get acquainted with this plow. Write for complete specifications. **J. I. CASE COMPANY, RACINE, WIS.**

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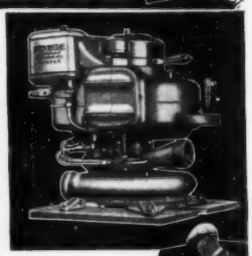
The SPORTSMAN

Only $55 for a genuine EVINRUDE that makes any rowboat a motor-boat! Cruise up to 7 miles an hour; discover new vacation and fishing spots; be fresh when you get there.

World's Lightest Outboard

Evinrude Sportsman weighs only 24½ lbs., is easily carried in one hand, requires little space in auto or Pullman. Newest streamline Hooded Power design. Gallon of fuel lasts over 2 hours. Complete with Underwater Silencing, Automatic Tilt-Up, Flexo-Rubber Steering, and other advanced features. Catalog shows complete line. Write today, EVINRUDE, 4391 N. 27th Street, Milwaukee, Wis.

EVINRUDE



High capacity with high pressure . . . up to 154 gallons per minute, up to 150 pounds Pressure.

FIRE FIGHTING

ONLY 65 LBS. **$295.**

Write today for complete performance tables and specifications on this newest-type, smooth-running four-cylinder EVINRUDE Fire Fighter. Develops 9.2 H. P. at 4000 R.P.M. Sand and other foreign substances handled without wear by simple, non-friction centrifugal pump of exclusive Evinrude design. Write EVINRUDE Division, Outboard Motors Corp., 4392 N. 27th St., Milwaukee, Wis.

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"BRONCO" 25 Cal. AUTOMATIC Vest Pocket Size

Fires 7 shots in 3 seconds; accurate; powerful; will not miss or jam; double safety; flat model; perfect grip; blued. **$7.45**

32 Cal. 8 shot Bronco Automatic..... **$8.45**
Holsters 75c; Cartridges—25 Cal. 65c; 32 Cal..... 75c
Hi-Standard 22 cal. Target Pistol; single shot; 6¾". **$6.95**
Hi-Standard 22 cal. Automatic Target; 6¾" barrel (reg. $20) **$17.95**
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Shoulder Pistol Holsters, state model and cal..... **$1.75**
Winchester: New Model 69 Bolt Action Repeater 22 cal. 5 shot; 25" barrel; Special price..... **$10.95**
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Mossberg Mod. 46—Reptr. 22 cal. 16 shot Rifle..... **$11.45**
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Telescopes: Achromatic 25X.....**$7.95; 30X**..... **$9.95**
LaGrande Binoculars: 8x30; genuine prism case and straps (Reg. $25)..... **$18.95**
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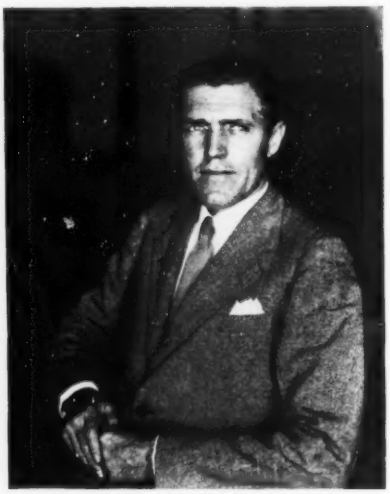
32 Deposit on C.O.D.'s Catalog: Telescopes, Microscopes, Firearms, Air Pistols & Rifles, Knives, etc. Send 3c stamp.
LEE SALES CO. (Dept. 0), 35 West 32nd St., New York

New Conservation Head in Pennsylvania: Upson Rejoins Forest Service

Thomas C. Buchanan, of Beaver, Pennsylvania, has been appointed Secretary of the Pennsylvania Department of Forests and Waters, succeeding Ralph M. Bashore, who becomes Secretary of the State Department of Labor and Industry.

Mr. Buchanan is thirty-nine years old, and while he has never before held public office, he has long been active in the fight against stream pollution. He holds degrees from Washington and Jefferson University and the University of Pittsburgh Law School. The new Secretary has been practicing law since 1922.

The appointment of Arthur T. Upson, trade promotion manager of the National Lumber Manufacturers Association, as director of the Southwestern Forest and Range Experiment Station, was announced late in July by the Forest Service. Mr. Upson will succeed G. A. Pearson, who at his own request is being relieved of administrative duties to devote full time to research. Mr. Upson is returning to the Forest Service after eleven years in trade extension and research with the National Lumber Manufacturers Association. Graduating in forestry in 1910 from the University of Nebraska, he entered the Forest Service as a forest assistant, subsequently serving as examiner, deputy supervisor, and forest supervisor, all on western National Forests. In 1920 he was transferred to the Forest Products Laboratory at Madison, Wisconsin, where he made important contributions to the studies dealing with utilization of little-used species of wood.



Thomas C. Buchanan

Several other important changes had been reported up to the time of going to press. A. W. Middleton, state forester of Idaho, resigned his position to become Idaho state director of the Soil Conservation Service. At the same time, it was announced that Richard E. McArdle, dean of the School of Forestry at the University of Idaho. has been selected by the Forest Service to head the Colorado Forest Experiment Station. Mr. McArdle was for a number of years connected with the Pacific Northwest Experiment Station, at Portland. He is succeeded by Dr. Dwight S. Jeffers, professor of forest management, University of Washington.

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Firs, Arborvitaes and Other Conifers. We raise all our trees in our own nurseries.

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CERTIFIED White Pine, free from blister rust. Norway and White Spruce, Scotch and Red Pine and other varieties. Know our reasonable prices. Get our figures on Contract Planting.
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finest named varieties, blooming sizes
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GAME KEEPER WHO CAN TAKE CHARGE of game bird raising and game restoration work (particularly Deer Ward) with broad practical and technical experience, desires position.
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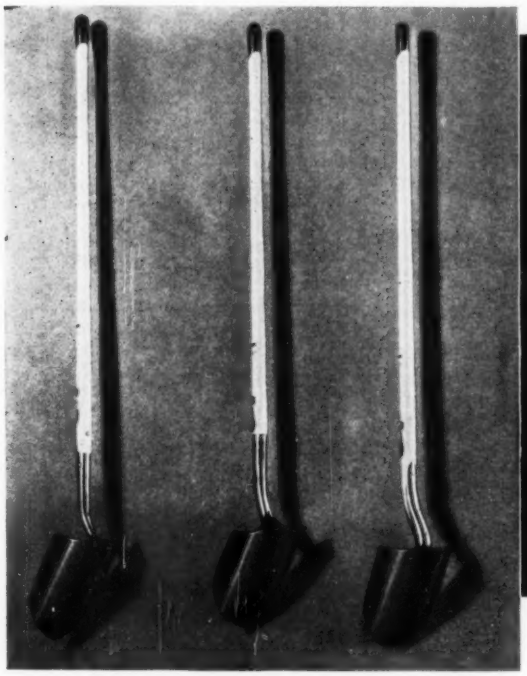

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In Forestry service, Conservation work, emergency tasks, and in the multitude of everyday things that must be done in forests and fields and highways, there is much that only a good shovel can do economically and well.

Ingersoll Shovels have kept pace with progress in other lines. To appreciate their fine balance, lightness, sturdy construction, keen, durable cutting edge, and clean scouring qualities, you must watch them at work and note the preference of men who use them.

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This special tillage steel, rolled in our own mills, has an interlocking mesh-grain structure, making splitting almost impossible. It is surprisingly tough, light in weight, and holds its keen cutting edge unusually well.

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Have You Seen Yosemite?

Yosemite is one of the great scenic wonders of the world. No photograph can truly picture the immensity of its sheer granite cliffs, the beauty of its high waterfalls, the grandeur of the age-old trees in the Mariposa Grove. Let us send you descriptive folders. Address Dr. Don Tresidder, Pres.

YOSEMITE PARK AND CURRY COMPANY
YOSEMITE, CALIFORNIA

Pacific Crest Trails Combined

At a recent meeting in Yosemite National Park in California, the Pacific Crest Trail System was organized. As a result, it will be possible to ride or hike 2,300 miles continuously on high government trails in the far West from Canada to Mexico.

Located almost entirely within National Forests and National Parks, the Pacific Crest Trail is under the protection and control of the United States Government. Of the 2,380 miles from Canada to Mexico, all is more or less wilderness trail with the exception of 275 miles over forest roads and 225 miles through developed regions.

The route begins with the Cascade Crest Trail, in northern Washington, follows it south 440 miles to the Oregon Skyline Trail, and then continues 410 miles to northern California, where it meets with the Lava Crest Trail. Three hundred and thirty miles south on this trail the route joins the Sierra Crest Trail and follows it to the Mojave Desert, a distance of 610 miles. The remainder of the trip is made over the Desert Crest Trail to Mount San Jacinto, in Mexico, a distance of 490 miles.

Extensive development and improvement of the trail system will be made by the Civilian Conservation Corps. Distinctive metal signs are to be placed so that the entire route will be adequately marked by the fall of 1936. Officials of the 190 National Forests and National Parks through which the trail winds are directing this development.

At the close of the meeting, a resolution was adopted recommending that "the Pacific Crest Trail System be maintained in its natural state as a primitive wilderness mountain area for the enjoyment of mountaineers and nature lovers."

NEW EDITION

TREE CROPS BY J. RUSSELL SMITH
Professor of Economic Geography at Columbia University
Vice-President, The American Forestry Association

TREE CROPS—is a plea for a new Agriculture—not merely a plan for reforestation, but a proposal to grow food crops for men and women.

FORMERLY $4.00 NOW $2.50

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ARISTOCRATS of the TREES, SHRUBS and EVERGREENS

Only the choicest of each group is included, and the book is quickly read and easily understood. No such selection is possible in any other catalog we know.

Evergreens—Hundreds of kinds, not only ordinary spruce, pine, hemlock, etc., but Rhododendrons and Azaleas (97 kinds), Cotoneasters (10 species), Holly (14 evergreen varieties and species), Heather (13 different). And in flowering trees and shrubs such things as Stewartia, Franklinia, Japanese Cherries, Flowering Crabs (27 varieties), and Magnolias (10 varieties and species). Redflowered Dogwood, Japanese Maple, etc.

The BEST of the FRUITS and NUTS

Hardy grafted Walnuts for the North—English and Black. Hybrid Hickories.

Blight-resistant Chinese Chestnuts.

New Huge Hybrid Blueberries.

Apples, Pears, Plums and Peaches in standard form, dwarf form, and the rare espalier-shaped trees.

BULBS FOR FALL PLANTING

Narcissus—at $4 per 100 and up. All large Double-nosed bulbs.

Tulips—170 selected varieties in all classes. Top size and priced lower than any other reliable company.

Hyacinth, Crocus, etc., in variety.

A Yew Hedge for 14c a Foot

True, hardy, upright Japanese Yew. Nursery-grown and twice transplanted. Plants are 12 to 15 inches high and priced **$22.50 per 100.**

Plant them 18 inches apart. 100 will cover 150 hedge feet.

Shipped light, roots packed in damp moss. Still larger sizes up to 4 and 5 feet at real bargains.

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For fifty years we have specialized in an extensive list of seedlings and transplants. Unbelievably low prices for fine young trees that will quickly grow up into perfect specimens with very little care.

Arborvitae, Hemlock, Fir, Spruce, Pine, Juniper and Yew from two-inch seedlings **at $5 per thousand up.** More than a hundred species of the above listed.

Native Flowering Dogwood, Oaks, Sweet Gum, Tulip tree, Birch, Maple, etc., **from $12 per thousand and up.**

Small roses, Azaleas, flowering shrubs of all kinds.

Transportation costs are small, stock carefully and lightly packed in damp moss, shipped by express.

Native Rhododendrons and Laurel for Mass Planting. Seedlings from $6 per 100 and up. Large clumps by the carload.

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For Your Friends—

FOR those whom you think would be interested in this 60th Anniversary Number of AMERICAN FORESTS, and for others who may wish to inquire about any of the subjects discussed in this issue, kindly send their names and addresses today to

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1713 K Street, N. W., Washington, D. C.

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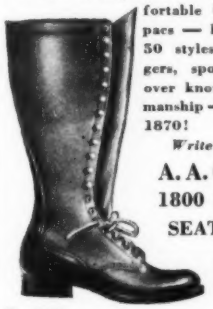
Foot comfort to Foresters—or any men who spend most of their time outdoors—is of utmost importance. Wear flexible, comfortable CUTTER boots or pacs — hand-made in over 50 styles. Foresters, loggers, sportsmen the world over know CUTTER craftsmanship — unexcelled since 1870!



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Established 1870
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NEW CHAMPION TRAILER FIRE ENGINES!

Complete Basic Equipment **$495**

Capacity 100 Gallons per Minute ☞ *At 100 lbs. Pump Pressure!*

Towns, Villages, Rural and Forest Districts may well consider Trailer Apparatus has many advantages.

☞ **As completely equipped as many larger fire apparatus trucks costing thousands.**

☞ If you are interested in rural or forest fire protection study this over.

☞ If you are interested in Village, Community or Industrial protection—perhaps Trailer Apparatus will serve even better than anything else at any price.

When all is said and done, the actual efficiency of fire apparatus depends upon the water supply. In cities and towns the water supply is practically unlimited. But in the Forest Districts the water supply is so limited that ordinary apparatus could not qualify at all. Nor would the investment be warrented from a mechanical or financial standpoint.

Champion Trailer Apparatus just fits in where some real adequate fire protection is needed. A new development by the Fire Engineers of Darley & Co.

While terrifically powerful in action, yet so exceptionally light weight a Ford or Chevrolet trails it at 35 to 40 miles per hour.

All Forest Wardens have cars. So any warden can in a jiffy hitch the Trailer to his rear bumper.

No. D432. Champion Trailer Fire Engine, complete with Centrifugal 100 GPM Pump, 20 ft. Suction Hose and all basic equipment. Shipping weight approximately 875 lbs., f. o. b. Chicago... **$495.00**

YOUR SATISFACTION GUARANTEED

Our customers ordering a Champion Trailer have the privilege of 30 DAYS' APPROVAL and FREE TRIAL. Try it, test it, work it, and if not to your entire satisfaction RETURN to US.

Under the guarantee of your satisfaction, any money paid us (in full or on account) shall be immediately refunded in full if you return the apparatus.

SPECIAL CHAMPION FIRE APPARATUS BUILT TO FORESTRY SERVICE SPECIFICATIONS

Darley engineers will give you any combination of equipment you desire. Fire fighting trucks built to carry as much as 500 gallons of water in booster storage tank. Designed and built to your specifications on any chassis you select, such as Ford V-8, Chevrolet, Dodge, International, Diamond T, etc. Equipped with the famous Champion Direct Front Drive Centrifugal Fire Pump which has passed all Underwriters tests and is available in three models—300 GPM capacity, 400 GPM capacity and 500 GPM capacity. Or with Champion Midship Booster Rotary Pumps, either 75 GPM or 200 GPM capacity.

Champion Direct Front Drive Centrifugal Pumps sold separately for mounting on any chassis or Fire Apparatus, old or new.

Little Giant Fire Fighter on Two Wheels

Engineering Excellence Is Apparent, Even Astonishing

Capable of SEVENTY-FIVE gallons of water a minute (nearly two barrels) and ONE HUNDRED pounds pressure, it is indeed a fire fighter! See it in action and it will win your respect—your admiration! Or at ONE HUNDRED FIFTY pounds pressure watch it bore a stream into burning rubbish, hay, straw, etc., or rip shingles off a burning roof.

Just one 2½ gallon hand extinguisher, with which we are all familiar, looks impressive. But think ◄ this mighty portable apparatus equals 30 such extinguishers EVERY MINUTE. In other words, 30 men each with a hand extinguisher would lay 75 gallons on a blaze and then, exhausted, would have to quit. But this powerful Fire Fighter can deliver 75 gallons a minute right along ◄ 750 gallons every ten minutes.

For Forest Fire work the apparatus can be trailed by any car or lifted into trucks and carried to the front. On such fires it will pump DAY and NIGHT, through long lines of hose, without stopping and with little effort.

No. D440. Portable Fire Engine. Complete with Rotary 75 GPM Pump, as illustrated above, f. o. b. Chicago..... **$395.00**

No. D441. Fire Hose. Special 1½" size, flat, MILDEW PROOF, with polished brass couplings attached to each 50 foot length. Per length..... **$16.50**

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No. D442. Brass Hydrant Coupling for connecting suction hose to fire plugs. ◄ Send a sample of your hydrant thread, as we make these to order only. Each..... **$4.25**

◄ Net weight of apparatus on wheels 592 lbs. Shipping weight crated approximately 650 lbs.

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Built on Character and Fair Dealing Since 1908

☞ EVERYTHING IN FIRE PROTECTION EQUIPMENT

☞ ON REQUEST OUR WONDERFUL CATALOG WITHOUT CHARGE

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WOODSMEN, hunters and trappers, who *live* in the open, give sheath knives the hardest possible service—and their Remingtons come through every time.

Remington Sheath Knives have forged steel blades. They hold a razor-sharp edge. Handles and sheaths are rugged, tough, and built to last a lifetime. Prices are attractive, too. Remington Arms Co., Inc., Cutlery Division, Dept. R3, Bridgeport, Conn.

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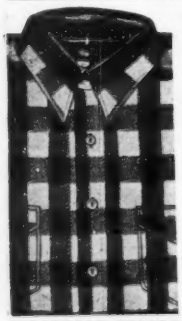

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FORESTRY IN CONGRESS

By G. H. COLLINGWOOD

The first session of the Seventy-fourth Congress adjourned on August 26, without action on several bills of major importance to forestry and conservation. All bills introduced during the first session retain their status during the second session of the Seventy-fourth Congress when it reconvenes early in January, 1936, and their consideration can be resumed at any time before final adjournment. A special session before then could only be called by the President for a specific purpose.

The proposal to change the name of the Department of the Interior and to coordinate certain government functions as set forth in S. 2665 was repeatedly urged by Senator Lewis, of Illinois, but the opposition of other senators caused it to be passed over until next January.

On July 30, Senator Copeland, of New York, laid before the Senate a bulletin dispatched by The American Forestry Association on July 24, protesting against enactment of S. 2665, together with a letter from Secretary Ickes summarizing his defense of the bill.

Evidence of the acceptance of this bill by certain senators was shown when Senator Copeland and his colleague, Senator Wagner, chairman of the Committee on Public Lands and Surveys, which had reported favorably on the bill, each made brief statements in its favor.

Again on August 16, when the bill came up on the regular calendar, Senator Smith, of South Carolina, declared emphatically, "This bill cannot be passed at this session!"

On the same day, Senator Borah, of Idaho, said there is considerable opposition to the bill from his part of the country, and suggested that it go back to the committee for additional hearings. This was not agreed to, and the bill went over.

Authority under the Taylor Grazing Act of June 28, 1934, to establish grazing districts on the unappropriated Public Domain may be increased from 80,000,000 to 142,000,000 acres in accordance with H. R. 3019 as finally accepted by the two Houses of Congress. The bill as received by the President for approval continues the language in the original Taylor Grazing Act and vests those land owners on whose properties loans have been made with what are interpreted to be perpetual rights to portions of the Public Domain. Representative Mott, of Oregon, attempted to eliminate this section from the act, but it was retained as protection to banks and other credit agencies.

Other amendments authorizing the Secretary of the Interior to make all appointments in the Grazing Administration without regard to the provisions of the civil service laws, but with the stipulation that each appointee shall be a citizen and resident of the State, or one of the States, in which the employee is to serve, threaten to throw the administration of the grazing districts into local politics. This provision may limit the employment of technically trained men to those who are graduates of colleges located in the States in which the grazing districts are located. The State's Rights principle is further supported by a section included by Senator O'Mahoney, of Wyoming, providing that the States may take over isolated areas of a section or less, if they are not put into grazing districts after the act has been in effect for two years.

The Secretary of the Interior will be definitely under obligation to cooperate with States which own lands within grazing areas in order to exchange them for Federal lands of equal value. He may also lease relatively small isolated tracts of public land to owners of contiguous lands.

One-half of the receipts derived from all grazing districts is to be returned to the States, and its expenditure within the counties where the grazing districts are located will be determined by the State legislature.

Believing that the advantage of increased area for grazing districts is cancelled by the several features added to the bill, Henry S. Graves, as President of The American Forestry Association, urged the President on August 27 to veto H. R. 3019. This would permit the next session of Congress to give more complete consideration of the proposed amendments to the Taylor Grazing Act.

Under S. 738 and H. R. 6594, now on the calendars of both Congressional Houses, the Secretary of the Interior, acting through the National Park Service, would be authorized to undertake a comprehensive study of the park and recreational possibilities of all publicly owned lands. On the basis of this study, the Secretary could recommend that such lands as are found to be chiefly valuable for state or local park or recreational purposes be transferred to the states. The Secretary of Agriculture has suggested the bill be limited to lands in the jurisdiction of the Department of the Interior, and that Forest Service representatives be included in conferences looking toward planning, establishing or maintaining park or recreation areas in two or more states where National Forests may be involved. The bill is looked upon as an opening for dismembering some of the National Forests, and is opposed by the Department of Agriculture.

Senator Wagner, of New York, stated on August 16 that he is willing to have the Senate reject the amendments proposed by the Public Lands Committee and include phrases excluding National Forests, but the bill was not considered, and no further action was taken.

The bill to provide Federal credit to the forest industries which Senator Fletcher, of Florida, discussed with President Roosevelt on July 5 was introduced by Senator Fletcher as S. 3417 on August 14. A companion bill, H. R. 9197, was introduced by Representative Caldwell, of Florida, on August 21. These are designed to create a $40,000,000 Forest Credit Bank, with authorization to issue government guaranteed bonds worth $200,000,000. The bank could make thirty-year loans for the utilization of forest products, the purchase of forest lands and properties, the building of transportation facilities and for general forestry purposes.

The President's interest is evidenced by his letter of August 7 to Ovid Butler, Executive Secretary of The American Forestry Association:

"I am glad to have the expression of opinion in your letter of July fifth on the importance of passing forest credit legislation," the President wrote. "It appeals to me because it should stimulate bona fide sustained yield enterprises on privately owned lands, and to such enterprises loans should be specifically limited.

"In general forestry legislation, I look forward to something broad enough in its scope to cover the most important phases of both public and private effort not now definitely or adequately provided for, and something which will constitute a landmark in the progress of forest conservation for many years to come."

Forest Service Adopts New Uniform

The forest ranger, a familiar figure to the millions of visitors to the National Forests, is to have a new uniform. Revised specifications for "field clothes" have just been issued by the United States Forest Service. The new uniforms supplant the old forestry green outfit with stiff brim hats, no longer distinctive of the Service's field men, since similar types of uniform have been widely adopted by other agencies.

The new clothes will be made of a fabric designated as "U. S. Forest Service bronze-green-heather." This tough fabric will be standard for all field uniforms, except those worn during the summer in the deep south, which are to be made of "twill-green", a light weight cloth. The new coat is a loose-cut, single-breasted, two button style with leather buttons and bellows pockets. The familiar pine-tree badge appears on the lapels.

The ranger's wardrobe may include three styles of trousers—straight cut trousers, riding breeches, and knickerbreeches suitable for hiking or horseback. Dark tan or cordovan are the specified colors for boots and shoes. Light gray-green stockings go with the knickerbreeches.

Hats are of light tan color known as "Belgian Belly," and are lightweight, featherweight, or zephyrweight. Shirts are of light olive-gray green, much like the Belgian Belly color of the hat, except that when no coat is worn the standard shirt is of dark forestry green flannel, arctic worsted or serge.

Foresters on Oberlaender Tour

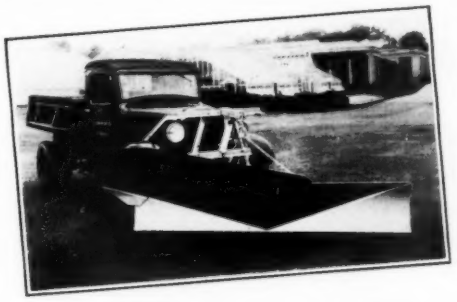
The Oberlaender Trust of the Carl Schurz Memorial Foundation, Inc., has announced grants to six American forestry experts, who sailed for Germany on August 3, to spend several months investigating various phases of scientific forestry in Central Europe.

The members of the group and their fields of specialization were: W. N. Sparhawk, senior forest economist, United States Forest Service—the social relationships of forestry; L. F. Kneipp, head of the Division of Lands, United States Forest Service—the utilization of forests for the local community; E. E. Carter, assistant forester in charge of Forest Management, United States Forest Service—the economic basis of silviculture; C. L. Forsling, director of the Appalachian Forest Experiment Station, Asheville—technical aspects of forest management, transportation systems, etc.; H. L. Shirley, associate silviculturist, Lake States Forest Experiment Station, Saint Paul—seed problems, including seed certification, etc.; and Aldo Leopold, in charge of Game Research, University of Wisconsin College of Agriculture—game management in relation to forestry.

Henry E. Hardtner Killed

Henry E. Hardtner, widely known as "father of conservation" in the southern states, president of the Urania Lumber Company, and for several years, since 1908, chairman of the Louisiana Conservation Commission, was killed on August 7 when his automobile was struck by a freight train near Lobdell, Louisiana.

Mr. Hardtner was born in Pineville, Louisiana, in 1870, and at the time of his death owned more than 70,000 acres of forest land, including some 3,500 acres of second growth long leaf pine protected by a fence. In this area he maintained plots to demonstrate tree growth under varying conditions. These plots, together with the desire of Mr. Hardtner to cooperate in the interest of forest advancement, led the Yale Forest School to include the Urania Forest, as it was known, as an important part of its annual southern field trip.



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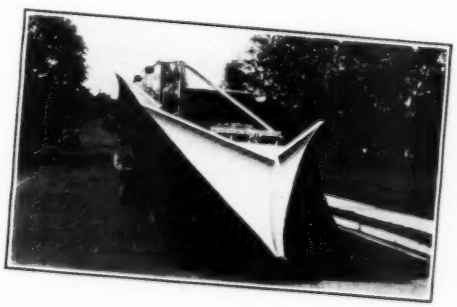

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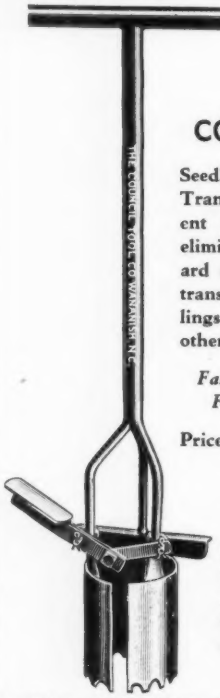

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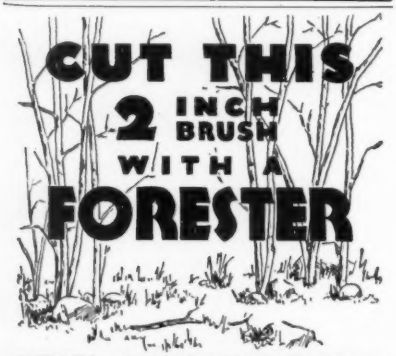

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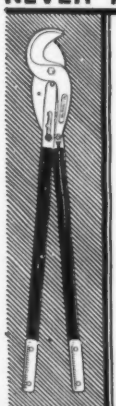

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Conservation Calendar in Congress

Published monthly while Congress is in session as a service to the members of The American Forestry Association. This calendar contains bills introduced in the First Session of the Seventy-fourth Congress between July 16 and August 21, as well as any action taken on bills previously listed.

BILLS APPROVED

H. R. 3061—SAMUEL B. HILL—Authorizing the adjustment of the boundaries of the Chelan National Forest in the State of Washington. Passed House June 15. Passed Senate July 29. Approved August 2. Public Law No. 227.

H. R. 7160—JONES—Providing for research into basic laws and principles relating to agriculture and to provide for the further development of cooperative agricultural extension work and the complete endowment and support of land grant colleges. Passed House May 15. Passed Senate amended June 10. House agreed to conference report June 26. Senate agreed to conference report June 27. Approved June 29. Public Law No. 182.

S. 2074—BYRD (H. R. 6734—MAVERICK)—To create a National Park Trust Fund Board, and for other purposes. Passed House June 3. Passed Senate June 10. Referred to Public Lands June 14. Reported June 18. Report No. 1254. Passed Senate June 27. Approved July 10. Private Law No. 201.

H. R. 6914—FULMER (S. 2739—COPELAND)—To authorize cooperation with the several states for the purpose of stimulating the acquisition, development and proper administration and management of State Forests and coordinating Federal and State activities in carrying out a national program of forest-land management. Reported by House Committee on Agriculture, May 6. Report No. 830. Passed House May 22. Reported by Senate Committee on Agriculture and Forestry July 22. Report No. 1145. Passed Senate July 30. Senate requested return August 1. Returned to Senate August 2. Amended in Senate August 8. Passed Senate amended August 12. Amendments agreed to by House August 15.

S. 2073—BYRD (H. R. 6670—MAVERICK)—To provide for the preservation of historic American sites, buildings, objects, and antiquities of national significance, and for other purposes. Reported by Senate Committee on Public Lands and Surveys June 7. Report No. 828. Passed Senate amended June 10. Reported by House Committee on Public Lands June 18. Report No. 1255. Passed House further amended August 5. Senate agreed to House amendments August 14. Approved August 21.

H. R. 4507—DREWRY—Establishing Appomattox Court House National Historical Park, and for other purposes. Passed House June 5. Passed Senate amended July 29. Amendment agreed to by House August 5. Approved August 12.

S. 997—GLASS (H. R. 109—BURCH)—To provide for the acquisition by the United States of Red Hill, the estate of Patrick Henry. Reported in Senate with amendments July 24 (No. 1149). Passed Senate July 29. Passed House August 6. Approved August 15.

NATIONAL PARKS

S. 3382—POPE—Establishing the Sawtooth National Park in the State of Idaho. Referred to Committee on Public Lands August 7.

S. 32—WAGNER (H. R. 89—MEAD)—Providing for the creation of the Saratoga National Historical Park in the State of New York, and for other purposes. Reported by House Public Lands Committee May 13. Report No. 872. Reported by Senate Public Lands and Surveys Committee with amendments July 25. Report No. 1154. Passed Senate July 30.

S. 2864—WAGNER (H. R. 7931—DE ROUEN)—Establishing the San Juan National Monument, Puerto Rico, and for other purposes. Reported by Senate Public Lands and Surveys Committee July 29. Report No. 1163. Passed Senate July 30. Reported by House Committee on Public Lands May 13. Report No. 880.

S. 3385—NORBECK—Providing for the exchange of government-owned submarginal lands for Indian lands or other lands for national monument purposes. Referred to Committee on Public Lands and Surveys August 7.

STATE PARKS

H. R. 9029, H. R. 9030—SCRUGHAM—To authorize the conveyance by the United States to the State of Nevada for State Park and other public purposes all the right, title and interest of the United States in and to certain lands in the State of Nevada. Referred to Committee on Public Lands August 2.

PUBLIC DOMAIN

H. R. 3019—DE ROUEN—To amend section 1, 3 and 15 of "An act to stop injury to the public grazing lands by preventing overgrazing and soil deterioration, to provide for their orderly use, improvement, and development, to stabilize the livestock industry dependent upon the public range, and for other purposes," approved June 28, 1934. Reported by House Committee on Public Lands March 25. Report No. 479. Passed House May 23. Reported by Senate Committee on Public Lands and Surveys July 2. Report No. 1005. Passed Senate amended July 31. House disagreed to Senate amendment. Bill now in conference. Conference report agreed to by Senate August 20; by House August 21.

MISCELLANEOUS

S. 2665—LEWIS (H. R. 7712—COCHRAN)—To change the name of the Department of the Interior and to coordinate certain governmental functions. Reported by Senate Committee on Public Lands and Surveys July 24. Report No. 1150. Referred to subcommittee House Committee on Expenditures in Executive Departments. Subcom. of House voted not to report August 13.

S. 3288—MCKELLAR—Consolidating certain forestry branches and other divisions and services in a separate bureau of the Department of Agriculture to be known as the "Bureau of Forestry." Referred to the Committee on Agriculture and Forestry July 19, 1935.

S. 3417—FLETCHER (H. R. 9197—CALDWELL—To provide for extending credit to aid in the conservation and operation of forest lands, to establish a Forest Credit Bank, and for other purposes. Referred to Committee on Banking and Currency August 14; House Committee on Agriculture August 21.

Suspend Naval Stores Licenses

The Agricultural Adjustment Administration announced August 1 that the license for processors of wood turpentine and wood rosin, and the licenses for agents, commission merchants, distributors and factors of gum rosin and turpentine would be suspended.

The order suspending the licenses, license provisions, and notice of termination of parts of the agreement, were signed by Acting Secretary of Agriculture R. G. Tugwell. This action was taken in order to permit the industry to reorganize its operations under the amendments to the Agricultural Adjustment Act which have been under consideration by Congress.

Stream Management For Parks

A policy of stream management, which stresses the importance of insuring protection to native species of fish in the National Parks and Monuments, has been announced by the National Park Service.

The program was made known following a careful study of game fish which have been used in the past for restocking streams in the parks. According to this report, trout—black, spotted, rainbow, steelhead, and golden—will be primarily used, when available, for restocking purposes. Lock Leven trout will be used in streams at low elevations.

According to the program, fish planting in virgin waters will be of native varieties only. In places where wildlife finds complete sanctuary, no planting will be undertaken.

Wildlife Institute Formed

The American Wildlife Institute, listing among its officers some of the country's outstanding industrialists, was formed last month in New York. Thomas H. Beck, President of the Crowell Publishing Company and active in the formation several years ago of the "More Game Birds in America" foundation, was elected President.

The aims of the new organization, which is to be "amply financed," according to President Beck, are announced as follows: "The Institute will form itself as a permanent central organization to promote and assist in the coordination with governmental authorities of wildlife conservation, restoration and management groups. It has been organized as a result of the need felt for it by men and industrialists who are also sportsmen and who are more or less 'fed up' with the random, loose and oft-times politically-controlled conservation and restoration methods of professional game-saviors.

"We are aware of the pressing necessity for a strong organization to coordinate all forces interested in the restoration of wildlife along pre-determined and sound lines, and to give widespread cooperation and support to securing proper recognition from Congress and state legislatures of the rights of sportsmen, and to advance a movement for wildlife restoration along constructive lines."

Other officers elected include: Chairman, Board of Trustees, Walter P. Chrysler, Detroit automobile manufacturer; Vice - Chairman, Herbert L. Pratt, New York industrialist; Chairman, Executive Committee, Powel Crosley, Jr., President, Crosley Radio Corporation, Cincinnati, Ohio; Treasurer, T. E. Doremus, Wilmington, Delaware; Business Manager, H. P. Davis, Bridgeport, Connecticut; Secretary, Seth Gordon, Washington, D. C., and Field Secretary, C. F. Shoemaker, also of Washington.

The new institute will absorb the American Game Association. At a meeting of the directors of the latter organization on August 20, it was voted to discontinue the American Game Association and to merge its activities with the Wildlife Institute.

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2 **Georgetown, South Carolina, 1933.** Type of line produced by one of Twenty-three (23) Hester Fire Line Plows in operation in the CCC and ECW camps in South Carolina.

3 **Tallahassee, Florida, August, 1934.** Putting the Hester 5 disc "25" Standard Fire Line Plow thru its paces on a demonstration for the Florida Forest Service.

4 **Reidsville, Georgia, December, 1932.** The Georgia Forest Service purchased this Hester 5 disc "25" Standard Fire Line Plow after witnessing this demonstration.

5 **Middleburg, Florida, Nov., 1931.** The first Hester 5 disc "25" Standard Fire Line Plow purchased by the Florida Forest Service in the Fall of 1931. This plow continues to produce efficient fire lines for the Florida Forest Service.

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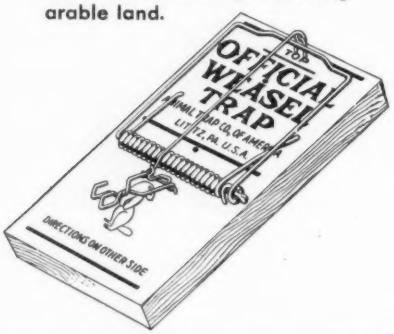

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Lightning Fire Record in Oregon

Breaking all previous 1935 records, lightning storms in Oregon started 125 fires during the week ending July 20. In addition, careless smokers were responsible for twenty-one additional fires during the same week, while campers contributed ten to the total.

The extraordinary electrical bombardment occurred in western and southern Oregon, and was felt most severely on the Rogue River National Forest, where thirty-eight fires were started. On the Whitman National Forest lightning caused thirty-one fires.

The largest blaze during the week was an eighty-one acre incendiary fire on land under Forest Service protection outside the boundaries of the Chelan National Forest. Of the entire 166 fires, all but six were brought under control before they had covered an area in excess of ten acres.

National Shade Tree Conference

The Eleventh National Shade Tree Conference will be held at Philadelphia, August 28 to 30. Among the important features to be discussed will be the Dutch elm disease, which has already resulted in the destruction of more than 300,000 elms around New York City. The discussion will be led by speakers in charge of field and research work in the metropolitan area.

Other subjects to be dealt with are municipal street trees, the preservation of shade trees in wooded areas, and a general discussion of insects and tree diseases. Dr. R. P. Marshall, of New Haven, Connecticut, is president of the Conference.

Fire Kills 10,000 Birds

Severe damage to timberlands and inestimable destruction of abundant wildlife were reported from a series of raging forest fires in scattered sections of the North Carolina coastal country. Near Beaufort, the Lenoxville Forest, including one of the largest rookeries in the State, was devastated, with thousands of gay-plumaged young herons dead. Dave Godwin, warden of the rookery, estimated that 10,000 young herons were killed. The mature birds flew over the desolate scene for several days looking for their young.

Volunteer fire-fighters battling a blaze along Bogue Sound banks reported deer and wild hogs, as well as other animals and reptiles, were fleeing before the fire. W. C. McCormick, assistant state forester in charge of fire prevention, said that about 100 volunteers were fighting the fires.

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Trail Riders of The National Forests Ride The Rockies

"Wind River Trail Rider expedition highly successful." This was the flash that came from Kemmerer, Wyoming, on August 10, from Samuel T. Dana, dean of the School of Forestry and Conservation, University of Michigan, and a director of The American Forestry Association, who served as the Association's representative on Expedition No. 2 of the Trail Riders of the National Forests. The riders, numbering thirty-two, entered the Wind River Wilderness on July 30, coming out at Gannett Peak Ranch, on Green River Lake, August 10.

During the period they explored one of the roughest wilderness areas remaining in the continental United States—the rugged crest of the Rocky Mountains that towers from 9,000 to 13,000 feet above the sea. For the most part it is a land of timberline trees, broken rock, ice and solitude; a land of glaciers, perpetual snow-valleys, and black canyons separated by ice-scored ridges.

This top country of Wyoming, which as the Bridger Primitive Area in the Wyoming National Forest, has been set aside by the Forest Service for scientific study and the enjoyment of the public. It is a country closely associated with such picturesque figures as Fremont, Bonneville and Jim Bridger.

Expedition No. 3, into the Gila Wilderness of New Mexico, numbering thirty riders, left Chicago on August 18. Erle Kauffman, assistant editor of AMERICAN FORESTS, is representing the Association.

Wallace Pays Tribute to the Forest Service

Returning from a trip extending through July and early August, in which five of the ten National Forest regions were visited, Secretary Henry A. Wallace paid tribute to the universally fine *esprit de corps* of the men employed in the Forest Service. "Everywhere," the Secretary said, "the men think first, last and all the time about the public interest as contrasted with regional or private interest."

Describing the improvements which have been accomplished in the administration of 170,000,000 acres of National Forests where logging has been conducted so as to assure an adequate and continuous timber crop and where millions of trees have been set out, the Secretary said, "No one has ever brought to my attention the slightest suggestion that any lumber company has profited unfairly as a result of Forest Service laxity or favoritism.

"The whole idea has been to devote the land and all its resources to its highest public use," he continued, "to fit National Forest lands for such uses as their character, that of their resources, and the needs of the public, will permit. To do this, multiple-use is necessary." He referred to the combination of selective logging to maintain the present lumber industry, with the development of camp grounds, renting of land for summer homes, development of streams for fishing, construction of roads and the maintenance of wildlife.

His special interest, however, was in the grazing problem, which he sees as inseparably linked with forest land. "No one who has not travelled in the West," he says, "can realize the terrible damage done by overgrazing. On the hills just east of the Salt Lake Valley in Utah, I call to mind how overgrazing of private land made it possible for heavy storms to start a mud flow carrying to the valley below boulders weighing over 100 tons. In this flow, fertile valley soil, houses and even human beings were covered up. In other cases overgrazing has resulted in the rapid silting up of reservoirs.

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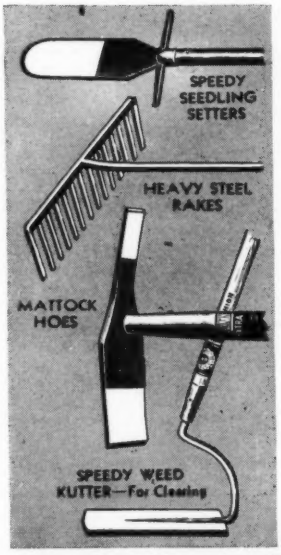

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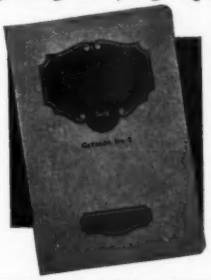

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Twenty Million Trees for Farm Planting

A total of 20,208,106 tree seedlings for woodland and shelterbelt planting was distributed to farmers in thirty-eight states and two territories through Federal-State cooperation last year.

The distribution was by state forestry departments cooperating with the United States Forest Service under the tree production section (Section 4) of the Clarke-McNary forestry law. The trees are distributed only for farm forest and shelterbelt planting and are sold at cost.

The number of trees distributed for farm planting showed a slight drop from last year's total, which was slightly under 22,000,000. However, state nursery production of trees for planting on state-owned land was tripled, the total being 74,993,463 compared with approximately 25,000,000 in 1933. Distribution of seedlings for planting on private timberlands other than farms also took a sharp jump, rising from nearly 12,500,000 in 1933 to more than 26,000,000 in 1934. Large numbers of trees were also produced by state nurseries for planting by the Civilian Conservation Corps.

The total number of trees distributed by state nurseries, not including stock planted by the C.C.C, reached 121,578,690 in 1934, compared with approximately 59,000,000 in 1933, according to reports from cooperating states to the Forest Service.

New York led with 48,452,500 trees distributed from state nurseries; of these, more than 4,000,000 were planted on farm lands, 40,500,000 on state lands, and nearly 4,000,000 on private timber holdings. Wisconsin and Michigan nurseries were second and third in distribution, with 18,000,000 and 15,000,000 trees respectively. Other large distribution totals were: Pennsylvania, 9,750,000; Indiana, 4,000,000; and Massachusetts, 3,000,000. Ohio, New Jersey and Puerto Rico distributed more than 2,000,000 trees each. Vermont, New Hampshire, Florida, Tennessee and Nebraska showed over 1,000,000 trees distributed for farm, private timberland and state land planting.

New York's lead in distribution of trees for farm land planting was followed by Puerto Rico and Pennsylvania, each with close to 2,000,000. States exceeding 1,000,000 in farm land planting were Wisconsin, Ohio, Indiana and Nebraska.

Trees planted by farmers in the East and South were almost solely for timber, pulpwood or turpentine production, combined in many cases with erosion control. Farmers' plantings in states west of the Mississippi River were primarily for windbreaks and shelterbelts.

In the East, red, white, Scotch and Norway pine, and Norway and white spruce were the leading tree species ordered by farmers. Delaware, Virginia, Kentucky, Mississippi, Tennessee, Iowa and Idaho showed greatest totals in black locust planting, this tree being widely used for erosion control. Loblolly pine led distribution in Maryland, Virginia and North Carolina. In the South, slash, loblolly and longleaf pine predominated, with heavy plantings of black locust in Alabama and Louisiana.

In the Lake States large totals of red, white and Scotch pine and white and Norway spruce were distributed. In Montana, Idaho, North Dakota, South Dakota, Wyoming, Oklahoma, Colorado, Utah, Nebraska, and Kansas, farmers planted many Chinese elm, caragana, cottonwood, red cedar, and other species suitable for shelterbelts and windbreaks. Washington saw heavy farm plantings of Oriental arbor vitae, Douglas fir and black locust; the latter two were most widely distributed in Oregon.

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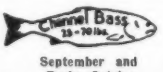

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Lumber Industry Reported Sound

For the first time in the four years of the existence of the Special Lumber Survey Committee no further general lumber stock reduction is recommended in its quarterly report to the Department of Commerce. The Committee estimates that the year 1935 will show a consumption of about one billion board feet of lumber greater than in 1934, or about an increase of six per cent. The Committee points out that the lumber industry has now reached a reasonable balance between production and consumption, with current stocks conforming to a favorable ratio with estimated demand during the balance of this year.

The Forest Products Division of the Department of Commerce, in reviewing the Committee's report, points out that for about five years the lumber industry has been confronted with many serious problems, particularly overproduction in the face of decreasing consumption. This resulted in the building up of increasingly larger stocks throughout the country during most of this period. However, partly as a result of the recommendations of the Special Lumber Survey Committee, as well as the Lumber Code Authority, lumber stocks were gradually reduced to the present favorable status. Since the dissolution of the controls of production established under the Lumber Code it will now rest with industry itself to maintain a desirable ratio between production and consumption.

Minnesota Wants More National Forests

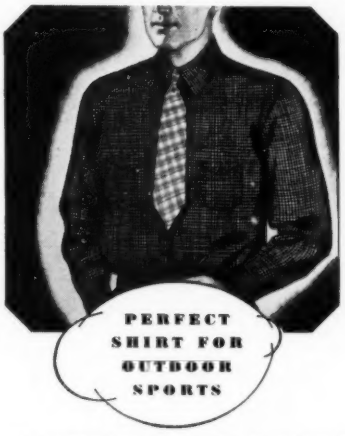
Additions of approximately 800,000 acres to the purchase area of the Superior National Forest, in northern Minnesota, have been urged upon the National Forest Reservation Commission in a resolution passed by the Minnesota Conservation Commission. The proposed additions include the Kabetogama State Forest, west of the Superior National Forest, and the Grand Portage State Park extending along the shores of Lake Superior to the Canadian boundary.

18,000 Drafted From Relief Rolls

Approximately 18,000 persons have been taken from the relief rolls and employed in Works Program projects by three Bureaus of the Department of Agriculture—Forestry, Entomology and Plant Quarantine, and Soil Conservation Service. On July 8, the Forest Service received $15,000,000 for the employment of 14,584 men to work on Forest Projects approved under the Works Program. On August 5, twenty-eight days after the Forest Service received this allotment, nearly 10,000 men were at work in forty-seven States and Puerto Rico. The work consists in building forest motor-ways, trails, firebreaks, and telephone lines, control of tree diseases and insects, thinnings of timber stands, planting on forest areas denuded by fire, and inexpensive facilities for public recreation.

On August 12, the Bureau of Entomology and Plant Quarantine had 7,340 men engaged in the control of the Dutch elm disease, the white pine blister, the gypsy moth and other tree insects and diseases. This constitutes forty-five per cent of the more than 16,000 people that will be required to complete these projects.

Within a few days after the $27,500,000 fund allocated to the Soil Conservation Service became available, more than 1,000 people had been given employment in sixteen states. The Bureau estimates that more than 21,000 people will be taken from relief rolls and employed in the forty-one states where the forty-seven old projects and the ninety-four new projects will be carried on.



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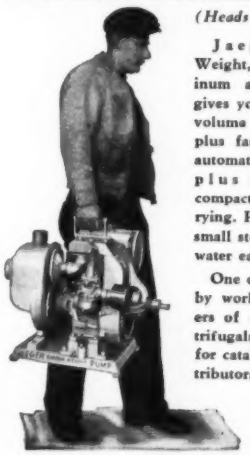

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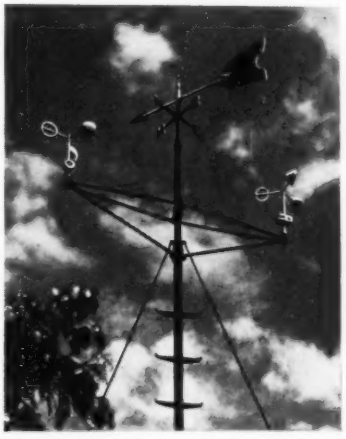

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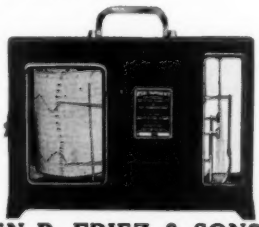

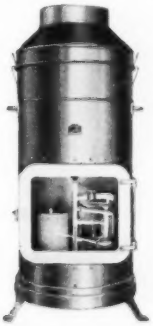

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THE organizations responsible for this announcement believe the program presented herewith merits the attention of the public and the members of The American Forestry Association.

1. Encouragement of forest owners to study the economic and other advantages of logging in such manner as to: (1) remove the mature and more valuable trees; (2) leave a sufficient stand to yield an early second cut, so distributed as to reseed the area; (3) in cases where clear cutting is desirable, to provide dependable and adequate sources of seed.

2. Insistence upon State and Federal legislation to establish conditions which will permit the orderly and rapid transformation of forest ownership from a basis of quick liquidation to one of sustained yield. Preeminent among the requisites are endurable taxation, a permanent credits establishment adapted to the needs of forest owners, and provision for limitation of production to market requirements.

3. Larger appropriations for the protection of National Forests and for cooperation with States and private ownership in protection work.

4. Expansion of Federal, State and other public forest ownership in conformity with policies developed by qualified representatives of all interested public and private agencies.

5. Education of the public to a more intelligent utilization of lumber and other forest products, and encouragement of public and private research in the utilization of logging and saw mill by-products and diversification of wood uses.

6. Cooperation by public agencies in the study of forest problems and by the administration of public forests so that private ownership may be encouraged to assume its proper share in permanent forestry.

The American Forestry Association gratefully acknowledges the public-spirited leadership of the organizations that make this announcement possible.

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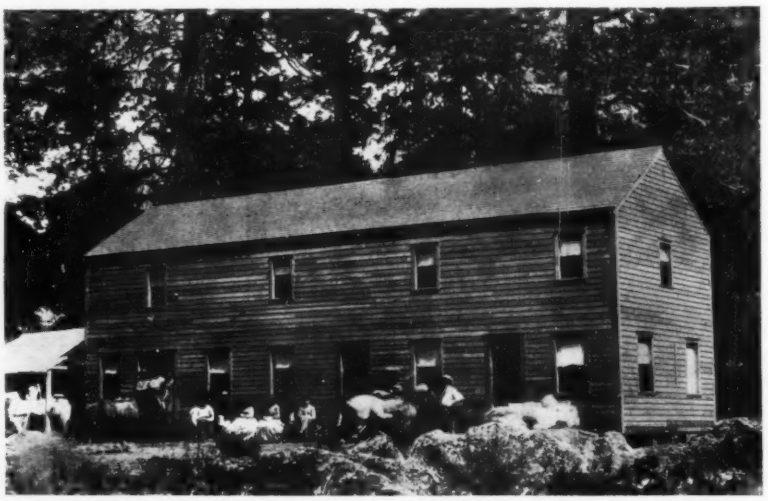
FIRST PHOTOGRAPH OF YOSEMITE

Interesting, and now historical, is the first photograph ever made in Yosemite National Park. To C. L. Weed, one of the nation's pioneer photographers, goes the honor of being the first man to turn a lens on beautiful Yosemite Valley. This was in 1859.

A few years earlier, in 1855, J. M. Hutchings conducted the first tourist party into the Valley. With him was Thomas Ayres, who made a number of sketches which are now in the Yosemite Museum. On his next trip, four years later, Mr. Hutchings was accompanied by Mr. Weed, who unpacked his camera and turned it on what was then known as the Upper House—a large frame hotel, built by Beardsley and Hite. This building is still standing and is now known as Cedar Cottage.

Shortly before President Lincoln signed the bill setting aside Yosemite Valley as a park in 1864, Mr. Hutchings purchased this property. It was to finish the hotel by making doors, windows and partitions that he engaged John Muir to build and operate a sawmill in Yosemite from 1869 to 1871.

A further interesting sidelight on the first photograph is that in 1929, Arthur S. Rosenblatt, of San Francisco, noticed a copy of the wood block print of the picture at the Yosemite Museum. He immediately made a hurried trip to San Francisco, returning several days later with an interesting scrapbook full of photographs, and the original was among them. He explained that around 1880, he played with the Hutchings children, in their San Francisco home. The Hutchings home burned and in his boyish way, he rummaged through materials strewn about the yard, and gathered up this collection of photographs, which he placed in an old mining share book. He restored it to the museum.



This picture of the "Upper House," was made in 1859 by C. L. Weed, and is the first photograph made in Yosemite.

ORIGINAL HOMESTEAD TO BE PRESERVED

To retain for future generations a proper memorial emblematical of the hardships and the pioneer life through which the early settlers of the West passed, a bill to establish the Daniel Freeman Homestead, in Gage County, Nebraska, the first homestead entered upon under the General Homestead Act, as a National Monument is now before Congress. The bill, S. 1307, passed the Senate on March 29, but final action in the House was deferred until next session.

The National Homestead Act was signed by Abraham Lincoln and took effect on January 1, 1863. It is still on the statute books, but there now remains only a comparatively small proportion of the Public Domain available to entry under its terms. Indeed, withdrawal orders have, for the present at least, suspended its operation.

Daniel Freeman was a Union soldier in the Civil War. He was in Nebraska on a leave of absence from his command. This leave was about to expire, and in order to get back to his command before its expiration, and to permit him to make the filing, it was necessary that the land office at Brownsville, Nebraska, where his homestead filing was made, be opened at midnight. This was done and Mr. Freeman made his filing during the first few minutes of the day on which the homestead law took effect. He served during the entire Civil War and then returned to the homestead.

Under this act there have been taken up in original homestead entries more than 505,000,000 acres of land, and an area in excess of 275,000,000 acres has gone to final proof and United States patents have been issued on it.

It is expected, if the bill becomes a law, that this homestead will become a museum in which the literature, the implements of agriculture, the means of transportation, and all other past incidents of pioneer life of the period through which the settlers had to pass in winning the West, will be preserved to future generations.

Revolutionizes Portable Fire Fighting Equipment

NEW TYPE "Y" PACIFIC PUMPER

GREATEST OF ALL PORTABLE FIRE FIGHTING UNITS

PUMPS MORE GALLONS PER MINUTE, WITH GREATER PRESSURE, THAN ANY PUMPER OF EQUAL SIZE AND WEIGHT
HAS EVERYTHING A PORTABLE PUMPER SHOULD HAVE

In this New Type "Y" Pumper are combined:

1. *Extreme light weight*—70 pounds;
2. *Superb smooth power*—Specially designed motor, two-port type; twin cylinders cast in block; alternate instead of simultaneous firing; certified power rating of 9.3 H.P. at 4000 R.P.M.;
3. *Super efficiency*—Pumps 63 gallons per minute at 100 pounds pressure; will supply two 1½-inch hose lines to capacity;
4. *Complete accessibility*—Pump of new design has direct opposed intake and discharge, which permits quick inspection of rotors and does away with bends in hose lines.

We unhesitatingly claim this pumper to be the most efficient and powerful portable fire fighting unit ever devised.

It has everything a portable pumper should have to guarantee *dependable service* under all conditions—built-in stamina, ample power, maximum pumping capacity, light weight.

We recommend Type "Y" Pumper as the ideal equipment for every emergency need for forest fire control, for protection in communities, resorts and estates, for protection of bridges, trestles, snow-sheds and other property.

Write for complete descriptive literature of Type "Y" Pumper and other models of the famous Pacific Portable Pumper line.

REPRESENTATIVES IN PRINCIPAL DISTRIBUTING CENTERS.

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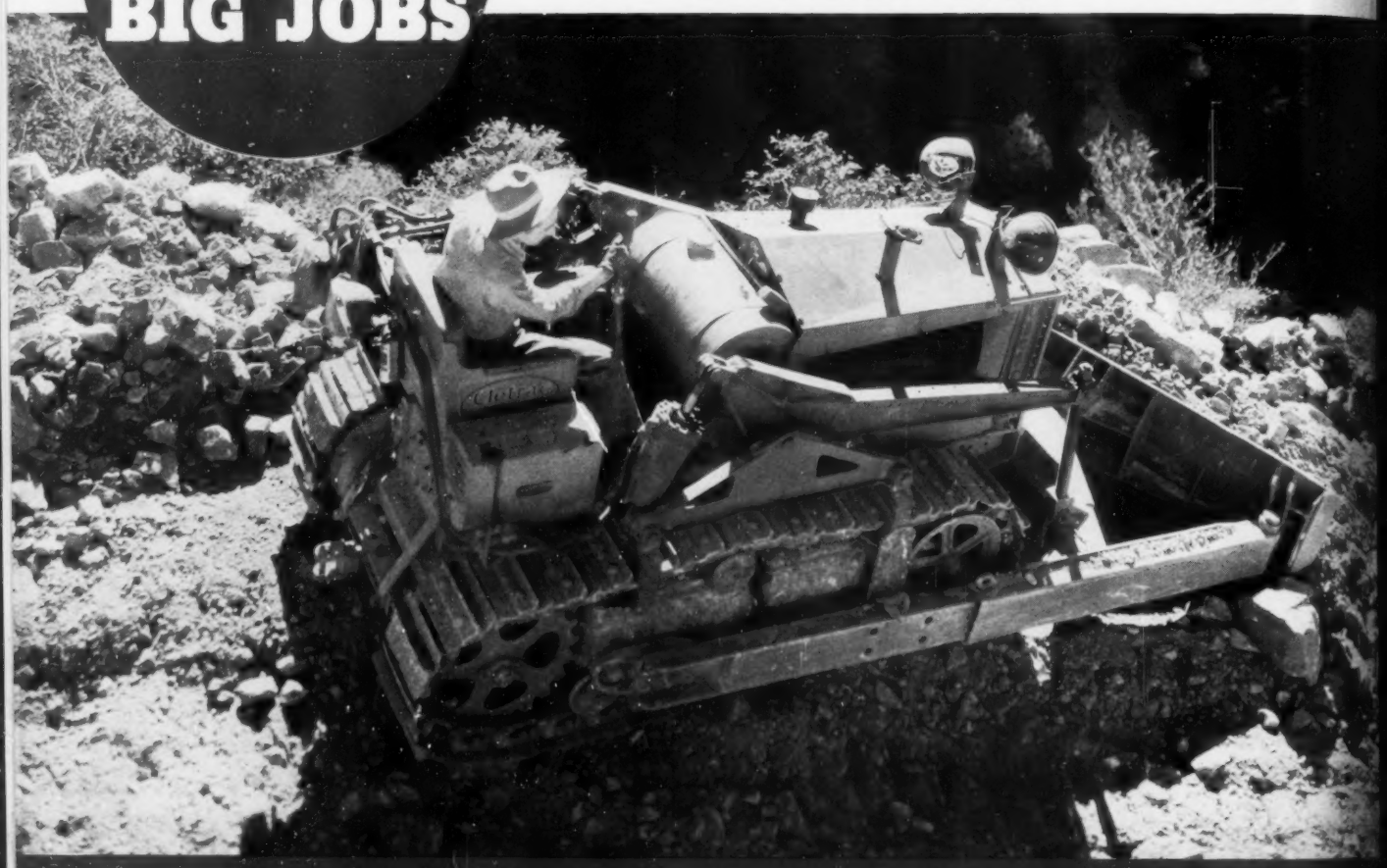
LARGEST MANUFACTURERS AND DISTRIBUTORS OF PORTABLE FIRE FIGHTING EQUIPMENT AND ACCESSORIES IN AMERICA

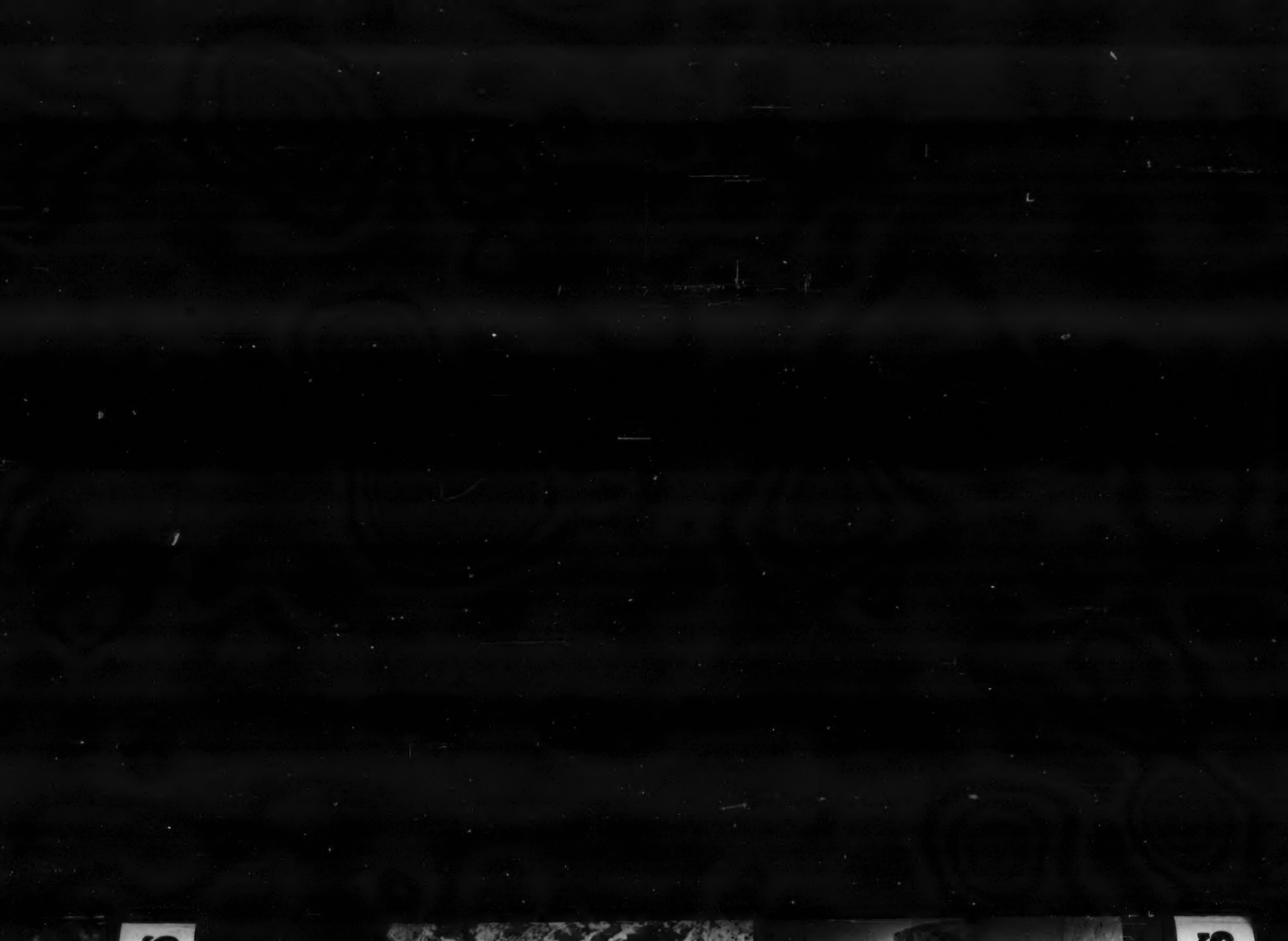
4 BIG JOBS ... in America's Forests



You will soon be able to drive in comfort over smooth road where this Cletrac is working.

The Federal Government employs hundreds of Cletracs in forestry work all over the country. These Cletracs are playing their part in building new roads and maintaining the old to make nature's beauty spots accessible by automobile. They are also preserving nature's beauty by cutting fire stops and opening trails for fire-fighting equipment. When fire does start, Cletracs rush men and equipment to the blaze—often in places where no ordinary equipment could go. Cletracs have proven so dependable that the government purchased almost a thousand more Cletracs this spring.

THE CLEVELAND TRACTOR COMPANY, Cleveland, Ohio

First the Cletrac is instantly on its way, rushing fire fighters and equipment to the blaze.

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